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**CONSTRUCTION AND EQUIPMENT**

**No. 38**

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CONSTRUCTION

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CAPITAL CONSTRUCTION DURING 11TH FIVE-YEAR PLAN

Moscow EKONOMIKA STROITEL'STVA in Russian No 5, May 1981 (signed to press 5 May 81) pp 3-12

*/Article: "Capital Construction during the 11th Five-Year Plan"/*

*/Text/* The 26th CPSU Congress outlined a grand program for our country's further economic and social development during the 11th Five-Year Plan and during the period until 1990.

In the reports of the General Secretary of the CPSU CC, Comrade L. I. Brezhnev, the Chairman of the USSR Council of Ministers, Comrade N. A. Tikhonov, and in the speeches of the delegates to the Congress great attention was paid to capital construction, since the following factors depend, to a large extent, on the state of affairs in this sector: the increase of the country's economic potential, the guarantee of the proportional, well-planned development of the national economy, and the rise in the material and cultural living standards of Soviet people.

The scope of the construction program being carried out in the country is enormous. During the past 10 years more than 1,100 billion rubles of capital investments have been directed into the national economy, which is more than the amount for all the preceding five-year plans taken together. During the 10th Five-Year Plan alone more than 1200 major industrial enterprises were put into operation and outfitted with up-to-date equipment. The renovation of production capacities at existing enterprises was carried out on a broad scale. During the period 1976--1980 91 billion rubles was allocated for their technical retooling and modernization; this is almost twice as much as during the 9th Five-Year Plan.

The material and technical base of agriculture continued to be strengthened. Capital investments in this sector for the 10-year period exceeded 300 billion rubles, including 170 billion rubles during the period 1976--1980, which allowed the fixed capital assets of this sector to be increased by a factor of more than 2.5.

The social program was implemented according to plan. During the 1970's the country witnessed the construction of the following: apartment houses with a total area of more than 1000 million sq. meters, preschool institutions for 5 million children, general-education schools with 14.5 million pupils' places, and hospitals with 660,000 beds.

Nevertheless, while mentioning the undoubted achievements in capital construction, we cannot overlook the major shortcomings which still exist in planning as well as implementing the construction program.

"While giving its due to the genuinely historic accomplishments of the Soviet people," Comrade L. I. Brezhnev noted in his report at the Party Congress, "the CPSU Central Committee also clearly sees the difficulties, shortcomings, and unresolved problems. Not all the ministries and enterprises have carried out their plans. There are still bottlenecks and disproportions in the national economy."

It may be stated with complete certainty that this point of view is also fully pertinent to capital construction. In its most concentrated form it is expressed in the fact that though the volume of state capital investments was in excess of the norm established for the 10th Five-Year Plan, the assigned tasks for putting fixed assets into operation were underfulfilled. The tasks of the five-year plan with regard to putting into operation capacities for producing individual types of output were not carried out, and this led, in a number of instances, to a violation of sectorial and inter-sectorial production proportions.

Despite the considerable aid rendered by the state to the construction ministries, the creation within the country of a major sector of building materials and structural components, and a significant growth in the machine- and power-worker ratio during the last few years, no notable increase at all has been achieved in the volume of contractual construction and installation work. Moreover, individual construction ministries and organizations have permitted a reduction in the volume of contractual work being performed by them.

There were quite a few reasons for such a state of affairs. During the 10th Five-Year Plan we did not succeed in carrying out a decisive turn to a more effective use of the production-technical potential which had been created in the country and thereby lessen essentially the tension which had formed in capital construction, to narrow down the front of operations, and to eliminate the dispersal of capital investments. Because of a lack of guarantees in individual cases of deliveries to builders of metal, cement, and lumber, as well as failures to meet the deadlines for manufacturing equipment, there was no assurance of the necessary balance between construction plans and material resources; in working out the one-year plans substantial adjustments were introduced into the tasks which were established by the five-year plan.

As before, serious shortcomings took place in the matter of planning and estimates. Many construction projects were not provided on schedule with the necessary and, most importantly, high-quality plans and estimates. On several occasions the cost estimates of many construction projects were revised upward. All this could not help but have an effect on the completion of assignments with respect to introducing capacities and projects into operation, and it hindered the timely preparations by construction organizations for developing operations on the construction sites.

In a number of regions in the country, because of an insufficiently well-thought-out solution to the problems of situating enterprises and an underestimation of the actual possibilities for increasing the capacities of the construction and installation organizations, their workload turned out to be excessively high. At

the same time, data from an analysis of the work of the construction ministries and the associations and trusts subordinate to them testify to serious shortcomings in the organization of construction production, a far from complete use of existing reserves for ensuring the growth of amounts of work and speeding up the rate of construction, deficiencies and a definite conservatism in the technical policy, methods, and forms of organizing labor on construction projects.

Serving as proof of this, for example, are the data on the growth of labor productivity in construction, which during the years 1976--1980 increased by only 11 percent. The average operating time of construction machinery during the last few years has practically not increased, and it amounts to 9.8--10.8 hours per day for earthmoving equipment and to 12.5--12.8 hours per day for erecting and tower cranes. There was no growth in the production of individual types of machinery nor in the natural indicators per unit of their capacities. There was a lowering in the level of use of capacities of plants engaged in large-panel apartment-house construction and metal structural components as well as by enterprises producing carpentry items.

In a brief period of time we must eliminate the existing shortcomings and achieve a radical improvement of matters in construction, as demanded by the decisions of the 26th CPSU Congress, in order to ensure the unconditional accomplishment of the tasks confronting this extremely important sector of the national economy in the 11th Five-Year Plan. But, as is well known, they are quite considerable.

During the period 1981--1985 we must carry out a large program of capital construction directed at solving the economic and social problems of the 11th Five-Year Plan and creating the necessary prerequisites for the well-planned and harmonious development of the national economy during the years following. The implementation of this program ought to ensure the speeded-up introduction of the achievements of scientific and technical progress and an increase in production intensification, further growth in the prosperity of working people, and the creation of better conditions on the production line and in everyday life.

Capital investments in the development of the national economy for the years 1981--1985 are increasing by 12--15 percent. This is somewhat lower than their actual growth rates during the 10th Five-Year Plan. However, the absolute amount of capital investments comprises 711--730 million rubles, which is considerably more than the amounts earmarked by the state for these purposes during the 7th and 8th Five-Year Plans taken together.

Thus, we will continue the course which was adopted at the 25th CPSU Congress toward attaining the assigned tasks of developing the national economy at lesser growth rates of capital investments than in previous years primarily by means of a fuller utilization of the economic potential which has already been created and by a further increase in the effectiveness of capital investments.

As outlined for the 11th Five-Year Plan, the sectorial structure of capital investments derives primarily from the task of further improving the national economic proportions and the most rapid possible elimination of certain complications along with providing the national economy with individual types of products and services.

It is primarily a matter of creating the conditions for a steady supply of fuel and energy to the country. For these purposes a increase has been provided in capital investments in developing the sectors of the fuel and energy complex; herein there is a sharp increase in the growth rate of capital investments in nuclear-power engineering, in developing the extraction of cheap coal for power production by means of the open-pit (strip) method, as well as in creating capacities for more complete processing and utilization of petroleum and natural gas.

Capital investments are being increased in the development of ferrous and non-ferrous metallurgy. During recent years the growth rate of production output in these branches has slowed down somewhat for a number of reasons. In the 11th Five-Year Plan we are confronted with the task of overcoming the lag in the development of the ore base of metallurgy, of significantly improving quality and expanding the assortment of products being turned out.

All sectors of machine building are being developed further. Capital investments in the development of machine-tool building are almost doubling, and this should ensure a significant rise in the technical level and competitive capability of the metalworking and woodworking machine tools being turned out by our industry, along with an increase in labor productivity and a reduction of production losses and wastes. The necessary capital investments are being provided to guarantee speeded-up development of chemical and petroleum machinery building, production of diesel and electric locomotives in order to provide railroad transport with them, machine building for nuclear power stations, tractor and farm machinery building, and machine building for livestock raising and fodder production.

In order to successfully implement the foodstuff program, considerable capital investments will be directed at strengthening the material-technical base of sectors of the agro-industrial complex: at developing all the sectors of agriculture, the sectors of the food, flour- and buckwheat-milling, mixed-feeds and microbiological industries, at measures for improving the preservation of agricultural produce, its transportation, processing, and delivery to consumers.

During the last few years major measures have been carried out with regard to speeding up the development of railroad transport, the most rapid possible elimination of the difficulties which have occurred with hauls of freight for the national economy in a number of directions. During the period 1981--1985 the volume and rate of capital construction in railroad transport will be increased. There is a increase in the volume of capital investments to be made in creating new and modernizing existing maritime and river ports and wharves, as well as road construction. Moreover, there will be approximately a doubling of the program to build roads with hard surfaces in rural localities, including roads which connect the central areas of kolkhozes and sovkhozes with rayon centers and general-use main highways. The solution of this problem will have enormous social and economic importance for the successful development of agricultural production.

During the 11th Five-Year Plan we must accomplish a great amount of work on modernizing and expanding enterprises and building a number of new enterprises in those sectors of industry which produce consumer goods.

Complex problems must be solved with respect to developing light industry. In this sector it will be necessary to create large capacities for producing

non-woven materials and knitted goods in order to reduce the proportion of the most labor-consuming processes of spinning and to free up existing capacities for producing fabrics which are in public demand.

As is well known, the decisions of the 25th CPSU Congress indicated the need to direct material and financial resources primarily at the technical retooling and modernization of existing enterprises, where production capacities could be expanded without new construction or with lesser proportions of capital outlays.

The past five years have confirmed the principled correctness and effectiveness of this trend of reproducing fixed production assets. The investigation which was conducted by the USSR Central Statistical Administration in 1979 on more than 320 industrial enterprises showed that outlays for the modernization and expansion of existing enterprises paid for themselves three times as fast as those made for new construction; the level of return on investment was 1.5 times higher, while the construction time periods were 27 percent less.

The course of intensifying production by means of increasing and technically retooling the production capacities of existing enterprises primarily in industry must be continued during the 11th Five-Year Plan. As Comrade L. I. Brezhnev pointed out in his report at the 26th CPSU Congress, both technical policy and capital-investment policy must be aimed at an economical attitude toward the social good, along with the know-how to fully and comprehensively utilize everything that we have.

The ministries and Union republics, based on the proposals of enterprises and associations, are called upon in working out the five-year plan and during the course of its implementation to seek out possibilities for the maximum increase of capacities by virtue of carrying out those measures which will achieve higher economic results from their implementation and, above all, significant savings in labor resources, improvements in working conditions, and speeding up the introduction of the achievements of advanced equipment and technology. Moreover, it is impossible to limit ourselves, as is frequently done, to the solution of merely current problems. Every enterprise and production association must have profoundly developed future plans for technical retooling, directed at the well-planned renewal of fixed assets and at eliminating bottlenecks in production.

Thus, the modernization and technical retooling of existing enterprises, based on new, more improved equipment and technology, should become the principal trend for creating additional production capacities.

At the same time, in a number of sectors, and primarily in the fuel, energy, and raw-material sectors, in transport, agriculture, and in sectors which process agricultural produce, the solution of the problems of ensuring the needs of the national economy in the corresponding types of output will depend, in large measure, on speeding up the construction and putting into operation of capacities in start-up construction projects of the 11th Five-Year Plan. In a number of cases it will be necessary to begin new construction projects in order to guarantee the assigned levels of production in the current five-year plan and to create the necessary inventory of construction projects underway for the ensuing years.

The inclusion of new construction projects in the five-year plan will be marginally limited and ought to be precisely based on the balances of using the corresponding production capacities in existing enterprises, as well as linked with the labor resources and genuine possibilities of the construction and installation organizations in the intended regions of construction.

Work on preparing the plans for the title lists and the lists of construction projects for 1982--1985 has still not been completed. Nevertheless, it is already possible now to name a number of large construction projects which, to a large extent, determine the development of their respective sectors and which will be carried out during these years.

In the sectors of the fuel and energy complex, plans are to introduce into operation capacities at the Kurskaya, Smolenskaya, Kalininckaya, Rostovskaya, and Balakovskaya Nuclear Electric Power Stations; construction will get underway and the first units will be introduced at the Khmel'nitskaya, Zaporozhskaya, and Krynskaya AES's and the Odessa Nuclear TETs.

Construction will be basically completed on the Sayano-Shushenskaya, Kolymskaya, and Kurpsayskaya GES's, and capacities will be put into operation at the Tash-Kumyrskaya, Cheboksarskaya, Nizhne-Kamskaya, and Bureyskaya Hydroelectric Power Stations; construction will get underway at the Boguchanskaya, Rogunskaya, Bay-pazinskaya, and Daugavpilskaya GES's.

Construction will be completed on the Gusinoozerskaya, Primorskaya, and the first stage of the Neryungrinskaya GRES's, power units will be put into operation at the Ekibastuzskaya No. 1, and the Kharanorskaya and Yakutskaya TES's, the Surgutskaya GRES, while construction will continue on the Ekibastuzskaya GRES No. 2.

Plans are to put into operation the first stage of the Ekibastuz--Central Region Direct-Current Electric-Power Transmission Line with a voltage of 1500 kV and the Ekibastuz--Urals Alternating-Current Electric-Power Transmission Line with a voltage of 1150 kV.

During the 11th Five-Year Plan the formation of the Southern Yakutsk Territorial Production Complex will be continued; construction of the coal cut and the dressing plant will be completed. The first stage of the Berezovskiy Coal Cut No 1 on the territory of the Kansko-Achinskiy Territorial-Production Complex.

We are scheduled to carry out the construction of a number of large, main gas pipelines; among these, for example, the Urengoy--Petrovsk with a length of about 3,000 km, the Urengoy--Novopokrov (Third Span), and the two Yambor--Yelets gas pipelines with a length of 3,500 km each.

Construction is scheduled to be finished on the Chardzhousk and Chimkent, as well as the second stages of the Mazheysk and Pavlodarsk Oil Refineries.

In the chemical industry provisions have been made to put into operation large capacities for producing raw sulfur at the Sera Production Association in L'vovskaya Oblast, apatite concentrate at the Apatit Production Association, nitro-ammophoska at the Novgorod Azot Production Association, methanol at the Gubakhinsk Chemical Plant, caprolactam at the Cherkassk Azot Production Association, yellow phosphorus

at the Novo-Dzhambulak Phosphorus Plant, as well as production capacities at the Tobol'sk Petrochemical Combine and the Tomsk Chemical Plant.

In ferrous and non-ferrous metallurgy provisions have been made for further expanding the Cherepovetsk and Novolipetsk Metallurgical Plants, for putting new capacities into operation for producing steel at the Oskol'sk Electro-metallurgical Combines, ferro-alloys at the Yermakovsk and Akyubinsk Plants, an extremely large workshop for producing tin at the Karagandinsk Metallurgical Combine, and large capacities for extracting iron ore at the Kacharsk Mining and Dressing Combine.

New, large capacities will go on line at the Sayansk Aluminum Plant, the Dzhezkazgansk Mining and Metallurgical Combine, the Tadzhiksk Aluminum Plant, and the ore-mining enterprises of Kazakhstan.

In the machine-building sectors during the 11th Five-Year Plan provisions have been made to put into operations capacities for manufacturing reactors for nuclear power stations at the Atommash Plant, the first stage of the Krasnoyarsk Heavy-Duty Excavator Plant, the first stage of an electric-motor plant in Ushgorod, and a plant to turn out truck-mounted concrete mixers in the Bashkir ASSR.

Modernization and expansion will be carried out on the Kolomensk Diesel Locomotive, Novocherkassk Electric Locomotive, Bryansk Machine-Building, and Penza Diesel Plants, as well as on the Voroshilovgrad Steam Locomotive Plant; the expansion of the agricultural machinery plant in Gomel' will be completed.

Construction will get underway on a plant to produce equipment for the oil refining and chemical industries in Western Siberia, and construction will be continued on enterprises of the electrical equipment industry in Minusinsk.

The largest start-up projects in light industry will be cotton combines in the cities of Andishan and Nukus, a non-woven materials factory in Chardzhou, rug-making combines in the Turkmen SSR and Kirghiz SSR. Plans are to complete the expansion of the Brest Rug and Cloth Combine and to get work underway on modernizing the Krengol'mskaya manufaktura Cotton Combine.

During the 11th Five-Year Plan provisions have been made to build more than 150 large-scale enterprises of the sugar, wine, brewing, and essential-oils industries; there will be more than 120 new industries in the meat and dairy industry, including more than 15 meat-packing combines and 50 municipal dairy plants.

In Naberezhnyye Chelny, Sverdlovsk, Tyumen', Krasnoyarsk, and in the Uzbek SSR up-to-date furniture factories will be built with enlarged capacities.

A great amount of work is planned to be carried out in the fields of water-management and land-reclamation construction. We must create large-scale irrigation systems for producing rice in Kazakhstan, Uzbekistan, Krasnoyarskiy Kray, the Kalmyk ASSR, and in the Far East, grain crops in the Volga Region, in the Northern Caucasus, and the Ukraine, fine-fibered varieties of cotton in Uzbekistan, Tajikistan, and Turkmenia. In the Non-Chernozem Zone of the RSFSR we are scheduled to drain 1.4 million ha. of excessively wet and swampy lands, to carry out irrigation on an area of 360,000 ha., to carry out technical-crop work on an area of almost 2.1 million ha. Plans are to proceed to build the fourth stage of the Great

Stavropol'sk Canal, to continue building the Danube-Dnestr Irrigation System and the second stage of the Dnepr-Donbass Canal.

In railroad transport during the 11th Five-Year Plan plans have been made to put into operation 3,600 km of new railroad lines, 5,000 km of second tracks, to electrify more than 6,000 km and to equip with automatic bloc systems and dispatcher centralization more than 15,000 km of railroads. Provisions have also been made to open up train traffic throughout the entire length of the Baykal-Amur Railroad Mainline, to put the Surgut--Urengoy Railroad into operation, to electrify the Trans-Siberian Mainline as far as Khabarovsk, and to completely finish electrifying the Omsk--Sverdlovsk--Kazan'--Moscow Line.

Plans are to increase capacities in the seaports of Vostochnyy, Vladivostok, Magadan, Tiksi, Il'ichevsk, Yuzhnyy, Novorossiysk, and Zhdanov, as well as to finish construction on the second stage of the Vanino--Kholmsk Ferry Crossing.

Work will be continued on building and modernizing the country's most important main highways. Construction will be completed on the Caucasian Pass Highway.

The development of airports has been envisioned in Yuzhno-Sakhalinsk, Magadan, Krasnoyarsk, Khabarovsk, Yakutsk, Noril'sk, Tyumen', Karaganda, Sverdlovsk, and Minsk.

A great deal of work must be carried out with respect to building non-production-type projects. In accordance with the Basic Directions during the period 1981--1985 we should build apartment houses with a total area of 530--540 million sq. m., basically completing the transition to the construction of apartment houses according to standardized plans with improved layouts of the apartments, as well as preschool institutions for at least 2.5 million children, hospitals and other health-care institutions with a view to increasing the total number of hospital beds by 8--10 percent. A great deal of work in housing and cultural-everyday construction must be carried out in rural localities. Herein all measures must be adopted for the fullest possible coordination between the volumes and the deadlines for production and non-production construction, particularly with regard to construction projects located outside the cities so that, based upon the comprehensive plans and tasks being provided in the title lists of construction projects, we can ensure the creation of the necessary housing and cultural-everyday-service facilities for the working people by the time the production capacities are put into operation.

Such is the far-from-complete list of major tasks in the field of capital construction which must be accomplished during the 11th Five-Year Plan.

As Comrade L. I. Brezhnev indicated in his report at the 26th CPSU Congress, the new five-year plan will be a serious test for builders.

The successful execution of this intensified construction program requires decisive improvement in planning and estimates, perfection of contractual and economic methods of conducting operations, raising the level of industrialization of construction production and mechanization of operations, improvement in the material and technical supplies to construction projects, and provision of complete sets of technical equipment to projects under construction.

All these questions were reflected precisely in the "Basic Directions for the Economic and Social Development of the USSR during the Period 1981--1985 and for the Period Extending to 1990," which was approved by the 26th CPSU Congress. Now, during the period of active work on planning for the Five-Year Plan of 1981--1985 as well as the 1982 Plan, we must give full consideration and ensure the implementation of the points of the Basic Directions with regard to further improving capital construction.

The five-year plan of capital construction for the years 1981--1985 must become, in fact, stable, balanced between the resources and the possibilities of the construction organizations, while the plan indicators, the system of calculations, and the interaction among the participants in the construction process ought to be aimed at achieving end results--the putting into operation of production capacities and projects. Only on this basis does it seem possible to ensure an extensive transition in construction to the new methods of management which were envisioned by the decree of the CPSU CC and the USSR Council of Ministers, dated 12 July 1979, and to strengthen the requirements and demands upon each manager to fulfill the plans.

In his report at the 26th CPSU Congress Comrade L. I. Brezhnev pointed out the following: "It is evident that the time has come to tighten up the requirements both as to plan discipline as well as to the quality of the plans themselves. Of course, the plan must be realistic and well-balanced. But it is equally a matter of course that it should be fulfilled."

In connection with this, we must place particular emphasis on the responsibility of the clients, contractors, and the planning organs for the quality of developing the title lists, as well as the lists of construction projects--the fundamentals of the plan of capital construction. It is no secret that, as it has taken form (although it is completely unacceptable under the conditions of a transition to five-year planning), when reviewing the title lists the volumes of work and indicators established for the first year of construction are considered to be more or less responsible (even though this does not avert frequent disruptions in fulfilling the plans). And in determining the assigned tasks for the ensuing years the calculation is often made on the basis, as it were, of the inevitability of making corrections to the one-year plans and on the relative lack of penalties for this.

Such a situation causes a great deal of harm. The title list of a construction project, as approved within the body of the five-year plan, with a breakdown of assigned tasks by individual years, ought to stand as an unchanged plan document for the entire period of construction, obligatory for all the organizations which are carrying out the construction, financing, and material support. We must also be strict in observing the principle of the mandatory completion of a lag which occurs in the course of the construction. This is one of the most important conditions for bringing order into capital construction, gradually eliminating the dispersion of capital investments, reducing the amount of unfinished construction, and bringing it to levels which are normal by 1985.

In working out a plan within the five-year plan and title lists of construction projects, extensive use should be made of materials from a recently drawn-up list of construction projects, as well as the operating results of reviewing the

construction cost estimates, eliminating in the plans all kinds of extras and excluding secondary factors from them. The plan should be built up on the basis of a realistic and stable cost estimate for the construction projects.

It is important to fully coordinate the plans of the preliminary investigative operations with the five-year plans of capital construction and to bring about the on-schedule delivery of the engineering specifications to the construction projects in good order. It is necessary to ensure a more complete use in the plans of the attainments of scientific, technical, and social progress, the rational utilization of lands, and the protection of the environment, a rise in the level of the technology of construction solutions, and a reduction in the material and labor consumption of construction.

The enterprises which are built must have high indicators with respect to production effectiveness and output quality, as well as developing planned capacities within short time periods. One of the principal criteria for evaluating plans ought to be the level of productivity and the savings of labor resources.

It is necessary to adopt measures so that from 1982 on we do not allow construction on the so-called privileged financing without plans or estimate specifications approved within the established procedure.

Much remains to be done with regard to improving the planning of contractual work. The plans of contracting construction and installation organizations for the five-year plan ought to be worked out in accordance with the new indicators provided for by the decree of the CPSU CC and the USSR Council of Ministers dated 12 July 1979. This is very important, since the indicator of commercial construction output is supposed to guide the activity of construction and installation organizations to the end result of construction production--the putting into operation of production capacities and projects. Operational experience on compiling the 1981 plan has shown that there are considerable difficulties and shortcomings here, and at times simply an irresponsible attitude toward introducing a new system of planning.

It is also necessary to see to it that the plans of the contractual operations be coordinated in the closest possible way with the plans for capital construction and that the on-schedule putting into operation of production capacities and projects in all sectors of industry and the national economy be ensured. The efforts of the construction organizations have to be concentrated on the fastest possible completion and start-up of those enterprises which are capable of ensuring the greatest possible growth in output and of unstopping bottlenecks. The plans of the contracting organizations should give full consideration to the intended volumes of work on modernizing and technically retooling existing enterprises which do not possess the genuine conditions for carrying them out by the economic method. This requirement can be met only if the five-year plans for developing the capacities of construction organizations are worked out by proceeding from the intended volumes of work and the territorial distribution of the construction projects.

One of the complex problems is the most rapid possible elimination of shortcomings in organizing construction production, sharp improvement of engineering training and the observance of construction technology, reinforcing order and discipline at construction sites, and strengthening the role and responsibilities of the

general contractor for well-planned progress in carrying out operations at construction projects.

During the 11th Five-Year Plan we must attain full utilisation of the capacities already created by the construction industry, construction machinery and mechanisms, raise the operational shift coefficient, ensure the more extensive introduction of progressive forms and methods of organisation and technology in construction production, and primarily the brigade system, as well as creating conditions for reinforcing personnel and increasing their skills. Within the briefest possible time periods we must complete the creation and material-technical supply of mobile construction organisations, expand the practice of carrying out operations on construction projects in remote regions by the efforts of these organisations, having prohibited their use for anything but this express purpose.

It is necessary to persistently continue work on converting construction production to assembly-line methods with a high degree of mechanisation in erecting construction projects out of consolidated units and structural components made in plants. For this purpose we must increase the output of progressive construction materials, consolidated units and structural components, furnish construction with heavy-duty transport and installation means for their delivery to construction sites and installation by industrial methods. It is necessary to significantly increase the output means of the so-called small mechanisation, based on their standardised products list and norm-sets. We must persistently seek out ways to correct situations whereby more than half of the construction workers are engaged in manual labor.

It is high time that we took a more critical approach to selecting the principal building materials, depending on the nature and the regions of construction. Problems must be resolved not in a stereotyped manner but creatively, with consideration being given to economic and technical feasibility. This has been talked about more than once. But the ministries and departments and their planning organisations, as before, and often to the detriment of the matter at hand, have been drawn to using precast, reinforced-concrete structural components, which require more outlays of metal and cement; they underestimate the potentials and the savings factor of monolithic reinforced concrete, wooden structural components, and local building materials.

Great reserves for intensifying and increasing the effectiveness of construction production are hidden within the potentials of perfecting the structure and organisational forms of management. Suffice it to say that at present in the country approximately 30,000 enterprises and workshops under the jurisdiction of scores of ministries and departments are engaged in producing building materials and structural components. In the Ukraine, Moldavia, and Georgia there still exists a five-step system of management. Hundreds of small-scale primary organisations have operating programs of less than 1 million rubles a year.

We must speed up work on making the transition to a two- or three-unit system of managing construction, consolidating construction organisations, and creating production construction and installation associations. General schemes for managing construction, taking into consideration the restructuring of construction management in regions and on the territories of krays and oblasts should be worked out and approved within the briefest time periods. General construction work on the territories of krays and oblasts should, as a rule, be carried out by integrated

construction outfits of a single construction ministry, utilising large rayon and inter-rayon bases of the construction industry. Particular attention should be devoted to perfecting the management of rural construction. Here we need to make more extensive use of the possibility of inter-farm cooperation.

Finally, within the briefest time periods possible we must complete the restructuring of the material and technical guarantees of construction in accordance with the decisions of the Party and the government concerning the improvement of the economic mechanism. At the same time we must decisively put an end to the uneconomical use of material resources, the unsatisfactory storage, damage, and squandering of rolled metal, cement, lumber, and other materials.

Fulfilling the capital construction plan during the 11th Five-Year Plan, together with the serious improvement in the work of the construction and installation organizations, constitute matters of extremely great importance to the state.

Strict and unwavering execution of the decisions of the Party and the government concerning improvements in planning and perfecting the economic mechanism in construction, combined with a strengthening of responsibility and reinforcement of executive discipline of enterprise managers and client organizations, contractors, organs of planning, administration, and material-technical support at all stages, from the working out of the plans and the estimates to putting the enterprises and projects into operation--such are the conditions for the successful solution of this problem.

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## CONSTRUCTION

### IMPORTANCE OF FIXED ASSETS IN CONSTRUCTION

Moscow FINANSY SSSR in Russian No 4, Apr 81 (signed to press 13 Mar 81) pp 35-38

(Article by A. A. Lebedev, Candidate of Economics: "Reproduction and the Utilization of Fixed Assets in Construction")

*Text/* In the decisions of the 26th CPSU Congress regarding the improvement of the economic mechanism a large place is occupied by questions of capital construction. This has been brought about by its enormous scope and role in the growth of the country's economic potential.

The effectiveness and quality of construction production depend, to a large extent, on how actively production assets are utilised. The decree of the CPSU CC and the USSR Council of Ministers, dated 12 July 1979, provided a system of measures aimed at considerably improving matters in construction. It also indicated the need to ensure the rational utilization of production assets in working out plans for economic and social development.

Serving as the point of departure, for determining (optimization) the amounts of the reproduction of production assets in construction, is the extent of the resources which this sector has at its disposal for implementing the tasks with regard to ensuring widespread reproduction. Included within the gross social product, a specific proportion is occupied by the amortization fund, which consists of two parts, earmarked for capital repairs and for the restoration (renovation) of capital (fixed) assets. The constant growth of these fixed assets in the national economy has brought about an annual increase in the amortization fund. With the systematic expansion of the fixed capital there is also an increase in the difference between the size of the amortization fund and the cost of reproducing the fixed capital which has been retired. For a socialist economy, motivated to the highest degree to attracting resources for capital investments, this is extremely important.

The accumulation (savings) fund in construction has more than tripled during the last 12 years. The norm of accumulation has also changed, but only insignificantly (within a range of 2-3 points), which testifies to the stability of the given type of expanded reproduction. It should also be noted that with a relatively stable norm of accumulation capital investments increase more rapidly. This latter circumstance testifies to the fact that the financial resources of inter-sectorial distribution take part in the expanded reproduction of construction's fixed capital.

If we draw a comparison using such indicators as the level of carrying out tasks with respect to putting fixed capital and capital investments into operation, then the situation turns out to be not in favor of this sector. For the national economy as a whole during the period of the 9th Five-Year Plan the introduction of fixed capital into operation was fulfilled by 90.7 percent, while for this sector the figure was 87.1 percent, or lower by 3.6 points, and only the level of plan fulfillment with respect to capital investments was almost equal. During the years of the 10th Five-Year Plan the fulfillment of the capital investment plan and the plan for putting fixed capital into operation in this sector was also somewhat lower than for the national economy as a whole. Thus, in recent years there has been no assurance of an outstripping development of the given sector--the most important prerequisite for the fulfillment of capital construction plans throughout the country.

Within the structure of this sector's capital investments there is a predominance of equipment; its share is approximately double that for the national economy as a whole. This inexplicable primarily by the fact that here a notable proportion is occupied by outlays for obtaining construction machinery and mechanisms, means of transport, and other equipment for construction organizations. Let us examine the technological structure of state capital investments as related to this sector:

Construction	1976	1977	1978	1979
Capital investments	100.0	100.0	100.0	100.0
Including:				
Construction and installation operations	18.9	21.3	18.5	25.7
Equipment	79.7	77.1	79.8	72.1
Miscellaneous capital outlays	1.4	1.6	1.7	2.2

As we can see, their principal weight (within the bounds of 4/5 points) is directed into equipment. Thus, the general trend toward improving the technological structure of capital investments in the national economy is also characteristic of the sector under study here. At the same time it is a characteristic of this sector that considerable specific weight in its volume is occupied not simply by equipment but by its most active portion--construction machinery and mechanisms, which do not require installation and which do not enter into the estimates of the construction projects.

Although construction as a sector is comparatively young, its fixed production capital, nevertheless, does require renewal because of wear, and particularly because of obsolescence. Consequently, a definite portion of the capital investments provided for is earmarked for the expansion, modernization, and technical retooling of enterprises.

At the present time capital investments in the sector for new construction predominate over investments in existing enterprises (by 4-5 points). If we

take into consideration the fact that enterprises expand basically by virtue of new construction, such a type of reproduction (new construction and expansion) exceeds modernisation and technical retooling almost three-fold. It is also necessary to bear in mind that capital investments allocated for modernisation and technical retooling are being reduced year by year, whereas they are growing into new construction and expansion.

It is undoubtedly true that such objective factors determining the growth of capital investments in the reproduction of new assets are present here as, for example, construction in undeveloped regions, where the production base for construction is being created essentially from scratch, the expansion of existing bases, and the creation of new ones where the material and technical base remains a "bottleneck." And, nevertheless, the problem of renewing the fixed capital in this sector by virtue of such types of reproduction as modernisation, technical retooling of existing enterprises, and the replacement of worn-out equipment by up-to-date, progressive equipment is an insistent one at the present time.

The problem of optimising the process of reproducing the fixed capital moves to the foreground the questions of the correlation between the amounts of fixed capital being put into operation and the utilisation of capital investments for this purpose. During the last 15 years it has been characteristic of construction that the rate of capital investments has been higher than that of fixed capital. The ratio of the cost of fixed capital being introduced to the volume of capital investments in 1965 amounted to 101 percent, while in the years following it has regularly remained at a level of 93--94 percent. Such a situation has undoubtedly led to a growth from year to year of unfinished construction, which had almost doubled by the beginning of 1980, as compared with 1970.

The level of unfinished construction in this sector (the ratio of the amount of unfinished construction to the capital investments of the respective year by actual cost for the builder) has also changed, increasing year by year, and has come to equal the following figures:

(as a percentage of the amount of capital investments)

1971	1972	1973	1974	1975
47.1	52.7	53.0	54.2	49.0
1976	1977	1978	1979	
48.0	53.0	54.3	57.0	

Moreover, the normative level of unfinished construction (including outlays for equipment not included in the estimates for construction projects) amounted during the 9th Five-Year Plan to 34 percent of the total volume of this sector's capital investments, and during the 10th Five-Year Plan--to 32 percent. Consequently, the excess over the norm reached from 13 to 20 points in 1971--1975 and from 16 to 25 points in 1975--1979.

It should be noted that despite the established norms of unfinished construction, their amounts are planned without taking these norms into consideration. Each

time in determining the plan dimensions of unfinished construction the point of departure is taken from its level as formed during the preceding year. Hence, the plan amount of introduction increases in comparison with the normative amount.

At the same time, with a high level of unfinished construction, the readiness of the construction inventory of projects underway for the sector is formed at an extremely low level. For example, with a norm of 43 percent the actual readiness of production-type projects being in a stage of unfinished construction comprised by 1 January 1976--17 percent, 1978--19 percent, 1979--16 percent, and 1980--18 percent, i. e., it was two or three times lower than that provided for by the norms. At first glance, such a conclusion may seem to be contradictory. However, it is indeed the case. The situation indicated above may be created in cases where, with one and the same amount of capital investments, the plan includes (in the inventory as well) a larger number of construction projects than would be possible under optimum conditions, when the norms of continued construction and the inventory norms are observed.

In order to explain the situation which has been created and draw the correct conclusions, let us examine the existing practice of planning capital investments. According to the order of their planning the title lists of the most important new start-up construction projects are approved by the USSR Council of Ministers upon presentation by USSR Gosplan, while the title lists of the remaining projects are approved by the USSR ministries and departments and the Union republic councils of ministers independently or in the sequence established by them. Thus, a very small group of construction projects is approved by the government of the USSR (approximately 1--1.5 percent of their total number in the plan). The question of including the remaining projects (99--95.5 percent) is within the competence of the USSR ministries and departments and the Union republic councils of ministers.

As a result, the number of construction projects in the plan is growing systematically from year to year. For example, in 1978 it included 40,000 production-type construction projects, including 10,200 new start-ups; in 1979 the respective figures were almost 41,000 and 10,300, i. e., construction projects included in the plan for the first time comprised more than 25 percent of their total number.

Moreover, among the newly begun projects approximately 95 percent have cost estimates of up to 3 million rubles; their title lists have been approved by ministries and departments.

Thus, under the existing state of affairs, when capital investments are dispersed among a multitude of projects being built at the same time, the construction time periods are held up and exceed the norms by a factor of 1.5--1.7. This inflicts great harm on the national economy, inasmuch as the latter does not acquire the additional production capacities by the deadline and, consequently, fails to receive needed output; enormous amounts of funds are tied up in unfinished construction, and additional expenditures appear. Rough computations show that every year because of lags in meeting construction deadlines this sector is short on output by more than 1 billion rubles.

And construction production, because it does not receive the necessary output in the form of structural components, items, and materials, is deprived, in turn, of

the possibility of completing the planned amounts of contract work. Moreover, as a result of delays in meeting construction deadlines, in many cases the plan specifications become obsolescent. It has to be revised, which requires the expenditure of additional means and distracts the efforts of planning organizations.

The scope of the harm merely to the planning and investigative operations may be conceived on the basis of the following data. For the national economy as a whole unfinished construction on account of state capital investments by the beginning of 1979 included incomplete planning and investigative operations in the sum of about 9 billion rubles. This is equal to approximately 2.5--3 years' worth of capital investments in planning and investigative operations for construction in future years. Analysis has shown that part of the plan documents became obsolete and is subject to re-writing or fundamental reworking (about 30--31 percent).

It is necessary to significantly curtail the amounts of unfinished construction, to bring it down to normative quantities. It would be incorrect to allow a lack of coordination between the plan and the normative levels of unfinished construction and the construction inventory. This is one of the aspects of the problem of optimising the process of reproduction. By means of concentrating capital investments, by concentrating them in the most important start-up and already-existing projects, a high degree of readiness of the projects is fully possible, and we must achieve an outstripping rate of introducing fixed capital in comparison with investments of funds. Analysis confirms that in the next five-year plan this will be a reality. It is undoubtedly true that it is necessary to conduct an inventory of all unfinished construction and to ensure a normative inventory of construction projects.

The economic mechanism of managing capital construction must also be reflected in the influence exerted by financial levers on reducing the volume of unfinished construction. It would be feasible to establish payment for it approximating the conditions of payments for production assets. It should be deducted for unfinished construction exceeding the normative level.

The amounts of capital investments in the "construction" sector should be formed on condition that the rate of their growth outstrip the amounts of construction and installation operations for the national economy as a whole; their fulfillment must ensure construction. We should also pay attention to another aspect of the problem of optimization. There has been a characteristic lowering year by year of the level of fulfilling the assigned tasks with respect to capital construction while the putting into operation of fixed capital has lagged behind every year (by 11--12.5 points) from the level of the plan assignments for capital investments. In the correlation which has formed among the reproductive components their derivative--unfinished construction--is increasing still more. To be observed here is a direct as well as an inverse interrelationship: on the one hand, the dispersal of capital investments leads to the non-fulfillment of the plan tasks and the growth of unfinished construction, and, on the other hand--the non-fulfillment of the assigned tasks with regard to putting fixed capital into operation and the lag in comparison with capital investments compells us to begin newer and newer construction projects, intensifies the trend toward deconcentration, which, in the final analysis, ends in still greater dispersion of funds and resources.

Consequently, the most important matter in the given situation should be measures with regard to the maximum concentration of capital investments in start-up construction projects and those underway with a high degree of readiness. It is feasible to sharply limit the beginning of new construction projects. We should bear in mind that during the next few years they may be begun only in those cases where this is linked with the mastery of progressive technology and only in regions which are remote from existing production bases.

Scientific and technical progress influences the increase in effectiveness of fixed production capital. Reserves for this are formed both in the process of creating construction machinery, transport, equipment, buildings, and facilities, as well as in their utilization and reproduction. And so the problem of increasing the effectiveness of fixed capital in construction requires a systematic, comprehensive approach, and it encompasses all stages of this complex.

During the period of the 10th Five-Year Plan the indicator of the return on capital investment for construction did not improve. Such a situation was linked with the significant increase in the capital-intensiveness of construction output, brought about by the increase of demands on the technical level, the mechanization and automation of production, improvement in the social conditions of labor, the implementation of measures with regard to environmental protection. Nevertheless, there are still great reserves in the utilization of fixed production capital.

Analysis has shown that the contracting organizations are not effective enough in their use of construction machinery and mechanisms. The growth rates of construction and installation operations lag behind the growth rates of fixed production capital used for construction purposes. During a lengthy period (1970--1979) the use of construction machinery and mechanisms, calculated in the number of hours operated per day, remained practically at the same level. For 10 years the increase in the continuousness of operation of a number of machines during the course of a day ranged from 10 to 50 minutes (excavators of all types, bulldozers, scrapers, cranes of the following types: railroad, tower, truck-mounted, and pneumatic-tire). For single-bucket and fork-lift trucks the operating time remained unchanged, while for such machines as dredges and excavator-crane it has been reduced.

A rather low level characterizes the use of this machinery with regard to time. Earthmoving machinery (except for dredges) and loaders operate for a total of only 8.5--10.9 hours a day, while for cranes of all types the figures are somewhat higher--10.4--12.8 hours a day. The utilization level of dredges is somewhat higher (more than 15 hours a day), but even this number of hours cannot be considered sufficient because, of course, these machines, taking their specificity into consideration, should be utilized for a longer period of time. The most unsatisfactory use has been by the following: multi-bucket excavators, fork-lift trucks, single-bucket loaders, tractors with mounted excavator equipment, and excavators with a bucket capacity of less than 0.25 cu. m. On a practical level, multi-bucket excavators and fork-lift trucks have worked together in the same shift.

The question of increasing the shift coefficient in construction production--one of the principal factors in increasing the effectiveness of fixed production

capital--has found widespread elucidation in the economic literature. In effect, however, matters have hardly changed at all.

The effectiveness of utilising construction equipment depends, to a large extent, on the rationality of the system of capital repair and maintenance. Unfortunately, the repair base is very widely dispersed throughout numerous workshops. A significant number of complex construction machines continue to be repaired in the workshops of the exploitation centers of construction organizations and mechanization administrations. The idle times of machinery and construction equipment awaiting repairs exceed the established norms. Thus, the level of centralized repairs in 1980 had not only not risen but had even gone down. The non-fulfillment of the plan for centralized repairs of construction equipment has led to a sharp increase in the length of time which machinery remains idle.

At the 26th CPSU Congress a great deal of attention was paid to increasing the role of working capital in strengthening cost accounting and improving its use. This is explained by the fact that under the conditions of the scientific and technical revolution, which is directly linked with progressive equipment, an important position belongs not only to fixed but also to working capital. The effective utilization of fixed production capital of construction depends, to a considerable extent, on the correct organization of working capital.

Studies have shown, however, that the requirements of construction in new, effective, and high-quality materials, structural components, and items are still not fully satisfactory, whereas the use of new economical materials allows us to reduce the weight of structural components, rationally utilize the country's material resources, improve the operational-technical quality of the buildings under construction, lower the estimated cost, and thereby increase the effectiveness of utilizing all the production capital.

The fullest possible utilization of the reserves which we have will allow us to increase the investment yield on production assets, and it will facilitate the increase of effectiveness and work quality not only in construction but in all social production.

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## CONSTRUCTION

### RESERVES SOUGHT FOR LOWERING ESTIMATED COSTS

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/Article by V. I. Prokhorov, chief engineer, deputy manager of USSR Stroybank Donetskaya Oblast Office: 'Methods of Seeking Out Reserves for Lowering Estimated Costs' /

/Text/ Within the complex of measures being carried out by Stroybank's institutions for increasing the effectiveness of capital investments, a leading role is being played by the search for reserves to lower estimated construction costs. To a definite extent, their reduction facilitates a more rapid putting into operation of projects and curtailing unfinished construction, as well as improving the indicator of specific capital investments.

In accordance with the bank's proposals during the 10th Five-Year Plan the estimated costs for construction projects in the Donetskaya Oblast were reduced by 256 million rubles. This is also double the amount for the 9th Five-Year Plan. If previously the reduction of the estimated costs was basically the result of verifying the quality of composite estimate-financial calculations and estimates on working drawings, as well as verifying the correctness of applying standardized estimates and norms of outlays, then a characteristic trait of today's engineering-control operations is the meticulous study of the technical-economic grounds for planning and construction (TEO) and the technical-economic indicators of construction projects (TEP). Consequently, there has been substantial economic effect. In 1979 our estimated construction costs were reduced by 51.4 million rubles, of which 17.1 million, or 33 percent, resulted from studying the TEO and TEP, while for 1980 the corresponding figures were 72 million and 50.2 million rubles, or 69 percent.

Analysis of the proposals made by the bank has shown that the most economical effect is ensured when the engineers and economists know the production technology and have a good idea of the prospects for its utilization. The Dobropol'skiy Department of Stroybank was presented with a plan assignment, and agreement, and an estimate for planning improvements in mining operations and ventilating the "Dobropol'skaya" Mine (with an estimated cost of 61.4 million rubles and cost of planning and investigatory work amounting to 695,000 rubles). In studying the body of the planning operations, it was ascertained that under this description the mine modernization will actually be carried out without taking into consideration the scheme for developing the coal industry. Moreover, it was revealed that the figure for the annual increase in coal extraction--150,000 tons (prior to the

modernization--850,000, after it--1 million tons) was outlined in the assignment pro forma; the actual extraction during 1979 exceeded this figure.

This office made a proposal concerning the unfeasibility of working out the mine modernization with such a plan. It was revised with the participation of the general director of the Dobropol'yeugol' Production Association, the director of the Dongiproshakht Planning Institute, and was adopted by the Ukrainian SSR Ministry of the Coal Industry. Instead of the previous task, specifications were worked out to prepare a new level for sustaining coal extraction. Thus, the necessary extraction in 1980 and during the 11th Five-Year Plan will be sustained with outlays of 30 million rubles less.

Experience and knowledge of the enterprise's activities permitted the Selidovnko-ye Division of Stroybank to make a proposal at the planning stage concerning the unfeasibility of constructing a unit to collect out the dry ash from boilers 3--7 and the ash-slag mixture from the ash tailings for customers of the Kurakhovskaya GRES at an estimated cost of 2 million rubles. The plan for this unit was developed by the Khar'kov Division of the Teploenergoprojekt Institute. It was known to this division of Stroybank that the two analogous units for boilers 1-4, which had been put into operation at the same enterprise in 1978, are in partial use, and their capacities are sufficient to guarantee the normal operation of the entire enterprise. This proposal was examined and adopted by the republic's Ministry of Power and Electrification.

The Zhdanovskiy Branch of the Donbassgrashdanprojekt worked out a plan for a plant infirmary with 400 places at a construction cost of 3.2 million rubles (7,967 rubles per place). After examining the plan specifications, the bank's employees discovered the groundless inclusion in the estimate of outlays of 402,000 rubles for the construction of a new building for the municipal decontamination station instead of the tolerable balance cost of 30,000 rubles. The plan provided for the construction of a cable railway (200,000 rubles) for which there was no need. Moreover, the construction site was increased and amounted to 115 sq. m in one place instead of 75 sq. m in accordance with the norms. Concerning the facts of violations of the planning norms the office reported to USSR Stroybank, at the request of which the ministry conducted an expert investigation of the plan and issued a directive for it to be revised. The cost of the infirmary according to the new plan has already been determined at 2.3 million rubles, i. e., 900,000 rubles less than before.

A significant economic effect is provided by a study of the technical and economic indicators (TEP) of enterprises for which the composite estimates on construction have not been closed. Particular attention has been directed at building enterprises in the field of ferrous metallurgy. Analysis has shown that in this sector clients have at their disposal planning and estimate specifications for at least seven years of construction. It has been established that on certain construction projects, because of prolonged construction time periods, the production technology has become obsolete. For this reason the Krasnoarmeyskoye Division of Stroybank proposed to revise the plan for modernizing the Krasnoarmeyskiy Dinas Plant, which has been under construction since 1961. After adjusting the plan in accordance with the new technology the estimated costs were reduced by 6 million rubles, and with consideration given to the increase in the annual profit, the total effect amounted to approximately 10 million rubles.

As a result of analysing operations provided for by the plans, taking into account the capacities actually introduced earlier at three plants--the Donetsk Ogneupornerud Association, manufacturing heat refractory items in the city of Chasov-Yar, the Krasnyy Oktyabr' in Konstantinovka, and the Veliko-Anadol'skiy in Volnovakhskiy Rayon--have proposed to reduce estimated costs by 11.3 million rubles. The Ukrainian SSR Ministry of Ceramic Metals has agreed to reduce costs by 8.8 million rubles, including 1.9 million rubles for the Veliko-Anadol'skiy Plant and 6.9 million rubles for the Chasov-Yar Plant.

The necessity for stabilization of approved estimated construction costs is mentioned in Decree No 695 of the CPSU CC and the USSR Council of Ministers. The tasks of the Stroybank institutions is not to fix the growth of estimated costs, but rather to prevent it. With this goal in mind, each instance of such growth at the stage of planning and construction is examined in the oblast office.

Thorough study of the TEP, as adjusted by the Leningrad Institute of Refractory Materials for the planned task of modernizing the Krasnogorsk Refractory Materials Plant imeni V. I. Lenin allowed us to establish an increase in estimated costs in accordance with the first variant by 38.1 million rubles and in accordance with the second variant--by 6.9 million rubles. The plan for modernizing this enterprise at a cost of 42.9 million rubles was approved in 1960. Since the beginning of construction 23.8 million rubles, or 56 percent, have been assimilated. The sharp increase in the estimated costs in accordance with the first variant increased the proportional capital investments from 0.64 rubles to 1.83 rubles. The annual profit was reduced from 8,730,000 to 614,000 rubles; hence, the recovery of investment (by profits) grew from 2.2 to 90.5 years. The unacceptability of such a variant is obvious.

The second variant provides for a reduction in the volume of production output from 190,000 to 120,000 tons a year with the construction of three furnaces (instead of five), producing 40,000 tons each annually. Moreover, the capacities for producing 117,400 tons a year are eliminated as outmoded gas-chamber production.

Analysis of the production technology and the plans to introduce capacities for the 10th and 11th Five-Year Plans has shown that, proceeding from the genuine possibilities for assimilating capital investments, during this period there will be invested only three complexes of tunnel furnaces with a total capacity of 120,000 tons of Dinas instead of the existing 117,000 tons a year with the obsolete method of production. In connection with this, the office posed the question of the unfeasibility of increasing the estimated cost of modernizing the factory. The USSR Ministry of Ferrous Metals issued a directive to revise the plan without increasing the cost.

This office has implemented a number of measures to organize the planning and coordination of the work of sub-departmental institutions. This has allowed us to carefully study and analyze the technical and economic indicators at the stage of planning and construction. Verifications have become much more extensive. If in 1978 the technical and economic indicators were studied at 58 construction projects, in 1979 this figure was 70, while the assigned task for 1980 provided that they be studied at 150 construction projects. During the first six months 69 were checked out. The office plans to render aid to branches in their studies of TEP's by the efforts of highly skilled engineers, assigning them to at least

two construction projects each. All the basic proposals resulting from studies of the TBO and TEP are examined in the oblast office with the participation of customers and representatives of the planning organizations.

Success in our affairs depends, to a large extent, on the skills of the engineers and economists. Therefore, in addition to classes which study directive documents of the USSR Stroybank Board and the Ukrainian Republican Offices, seminars are conducted two or three times a year on the basic questions of engineering control work. Delivering oral reports here are the office's most highly skilled engineers, and branches exchange experience. An economic school functions on a regular basis, where experienced, knowledgeable economists give lectures.

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USSR MINISTER OF INDUSTRIAL CONSTRUCTION INTERVIEWED

Moscow STROITEL'NAYA GAZETA in Russian 29 Apr 81 p 2

[Interview of A. M. Tokarev, USSR Minister of Industrial Construction by free-lance correspondent A. Vladimirov]

[Text] The 26th party congress placed important tasks before construction workers. They are required to struggle with even more persistence against the dispersion of personnel and money, to more effectively utilize material-technical and labor resources, and to uncover and fully introduce internal reserves into production. All this should be reflected in the five-year plan which, in accordance with the decisions of the congress, will be drafted and presented for review by the October 1981 session of the USSR Supreme Soviet. How work is progressing on drafting a five-year plan is discussed by A. M. Tokarev, USSR Minister of Industrial Construction, in an interview with our free-lance correspondent A. Vladimirov.

[Question] Aleksandr Maksimovich, in years past our construction workers worked according to yearly plans. Now, a new task has been placed before us—that of working out stable five-year plans with a separate breakdown for each year.

[Answer] Yes. This will also mark a new stage in expanding construction. Our long-range prospects are based even more on scientific knowledge and on more precise economic calculations.

[Question] How is this planning work organized in practice?

[Answer] The USSR Ministry of Industrial Construction has fully informed each of its republic ministries, main administrations and associations of Gosplan USSR of the control figures for basic indicators and economic norms for 1981 through 1985. These stipulate the tempo in the increase of construction production goods, in the production of goods in their natural form; they call for an increase in labor productivity calculated on the basis of the individual worker, set the number of workers and employees (for industrial enterprises and construction sites), determine wage standards per ruble of production (for industrial enterprises), and fix tasks connected with the improvement of production management.

Guided by these control figures, all of our subunit specialists have begun--in a joint effort with public organizations—plan calculations. These are coordinated with our customers, with supply organizations, with the people who deliver equipment, and with local agencies. Let us note here that these plan calculations

are already based on enterprise passports [used in over-all national economic planning] which permit us to draft more precisely for each a strenuous yet feasible plan.

We have now come, as our planners put it, to the balancing phase. Using our own capabilities, we are supposed to coordinate our plans with those of our construction partners. In connection with getting our all-union socialist competition under way, we must take into consideration the plans and initiative of the labor collective.

The procedure for reviewing construction projects and for including them in the plan has become more purposeful. First and foremost on the agenda are those more important production installations which L. I. Brezhnev spoke of as enterprises capable of providing the greatest increase in production and of eliminating production bottlenecks. In this manner we achieve the required concentration of resources at various stages in our planning process.

[Question] Aleksandr Maksimovich, please give us more details on the concentration of resources upon installations which are about to be placed into operation.

[Answer] In areas where construction is concentrated, there are usually several priority installations being erected. In accordance with the Basic Directions, plans call for these installations to be placed into operation at an accelerated pace.

There are three types of managerial decisions which follow as a consequence. The first is that of the expeditious creation of a production base at such places, the execution of a maneuver in respect to the resources of nearby organizations subordinate to the ministry, resources which are free at the moment. It was such expertise and such a maneuver which aided us, in particular, with the successful completion of the first section of the Nikolayev aluminum oxide plant and of the "150" rolling mill at the Beloretsk Metallurgical Combine imeni M. I. Kalinin.

A second type of decision is used when insufficient means are available to us. We then call upon our mobile organizations, first and foremost the All-Union Specialized Soyuzspetspromstroy Construction-Installation Association. This type of action worked well in the construction of a new installation at the Groznyy Petroleum Processing Plant. Finally, if all other resources have been exhausted, what we do is to invoke the principle of priority during the planning stages; included in the plan are the construction projects which are of most importance to the national economy, all of these backed with the proper resources.

[Question] The 26th party congress devoted special attention to the erection of industrial installations in a complex including housing and social-cultural buildings. How is this task being reflected in the plan?

[Answer] In planning for such an infrastructure, we already possess a certain degree of experience, although it is not very extensive. Take for example the Prikumskiy Plastics Plant in Stavropol'skiy Kray and the Krasnodar Chemical Plant in Belorechensk which were built as a complex with housing and civil construction installations. In planning work load capacity, we take into consideration the

continuity and the complexity of construction together with the availability of local housing construction capacity. We allocate to our reserve balance work capacity designated for above-limit construction projects.

[Question] What is the ministry contemplating as to the attainment of its control limits? What possibilities are you counting upon?

[Answer] Control figures set for the USSR Ministry of Industrial Construction for the 11th Five-Year Plan call for a significant increase in the volume of its work. As early as 1981 we will have to fulfill general contracting work which comes to 6,825,000,000 rubles. This is 17 percent more than last year. First and foremost, of course, is our program for placing installations into operation, a program considerably complicated by the fact that we are carrying over into it 355 industrial plants and installations listed in our national economic plan.

Unfortunately, the number of national economic plan installations being built at the same time has not been reduced. Nor has there been a decrease in the tendency to reduce the volume of work which is to go into one specific construction project.

There is a certain feature which needs to be commented upon. Material resources are being allocated not on the basis of millions of rubles but according to the physical volume and estimates for those installations constructed according to compensation agreements and with an entire complement of imported equipment, for the more important structures located in the RSFSR Nonchernozem region, for installations producing mineral fertilizers, and for the light, food and a number of other industries.

Our plans call for a fundamental change in construction labor productivity. Over the five-year plan period, it is to be improved by 15 to 17 percent. To achieve those control figures, the ministry has worked out its "Basic Directions in Increasing Labor Productivity Throughout the Ministry of Industrial Construction USSR for the Period 1981-1985." Fulfillment of the designated measures will facilitate the rise of this indicator by 15 percent and will cut back on the labor expenditure of over 90,000 people. We shall resolve our main problems involving labor intensification with 11 long-range, pertinent scientific-technical programs. Thus, the relative proportion of fully pre-assembled construction is to increase to 72 percent. The volume of structural work involving large-diameter elements is to be increased one and one-half times.

Industrial and housing construction installations will be placed in the main stream at an ever more rapid rate. As early as 1981, the more important installations of the USSR Ministry of the Petroleum Refining and Petrochemical Industry, of the USSR Ministry of the Light Industry, and of the RSFSR Nonchernozem region will be placed into operation. We intend to fulfill about one-half of our housing construction programs using the "continuous" construction system introduced by workers of the city of Orel. We will use the brigade method for 38 percent of industrial construction, for about 65 percent of housing and civil construction, and for about 45 percent of agricultural construction. We plan to introduce everywhere the Irkutsk method of complex engineering preparation for construction work. There will be a two-fold increase in the zone of application of the Vin-nitsa method of planning, accounting and supply for augmented construction brigades, which will facilitate the transition to a higher form of basic cost

accounting--the mobile-emergency crew construction method. There will be a doubling in the volume of construction using the subassembly method.

[Question] Aleksandr Maksimovich, during the 11th Five-Year Plan there will be significant improvement in the mechanism of economic management with many changes in the mutual relations between participants in the investment process. What are the advances which you foresee occurring here?

[Answer] As I have already stated, the level of planning work has improved noticeably. The influence of economic levers, particularly that of credit, has been strengthened. There are a number of yet-unresolved questions, however. For the time being, the plan for goods production is approved only by ministries which are in that particular line of work. The ministries which are the customers for such goods do not bear any material responsibility for failure to fulfill their obligations.

The greatest portion of those construction installations, which we as the contracting ministry fail to place into operation on schedule, are not completed because of failures or omissions on the part of the ministries ordering such work, a fact which has been acknowledged by the State Arbitration Board. In 1980, this proportion reached 59 percent. Through the customers' fault, installations, such as an industrial plant capable of producing 50,000 tons of caprolactam within the "Azot" Production Association in Grodno, a gas-processing installation at the Baku Petroleum Processing Plant imeni 22nd party congress, et al., were not placed into operation. As in the past, many customers succeed in putting in the plan construction projects which do not have the necessary documentation, equipment and financing. As a result, contracts have yet to be concluded for more than one-third of the construction projects included in this year's program.

In our planning work, we still do not do everything we can to regulate the tempo of placing installations into operation. Most installations to be placed into production have year-end deadlines. Out of 266 such projects in the plan for 1981, only one is planned for completion in the first quarter; 17 for the second quarter, 30 for the third quarter, and 218 for the final quarter of the year. The consequences of such planning is obvious. What we shall have to do, evidently, is to use the law to strengthen the equal economic responsibility of all participants in construction for the end results of their work. A unified set of regulations on the methodology for determining the work capacity of construction organizations still remains to be drawn up. This has created a great deal of difficulty, particularly in combining territorial and branch of industry planning.

To bring some order into providing the construction industry with material-technical resources, Gosnab USSR must completely shift to providing supplies according to projects and estimates, to simplify the present multi-stage system of supply, and to guarantee the realization of allocated funds.

Gosplan USSR is now maintaining a course aimed at planning "based on future resource capabilities." It is high time for it to start planning "out of available resources." Otherwise, we will never achieve a balance between plans and resources, something which was pointed out at the 26th party congress. With an annual increase of 17 percent in work volume, there has been only a 3 percent

increase in supplying our ministry with materials. The Material Balances Department of Gosplan USSR should take it upon itself to be more precise in figuring out the real needs of construction projects for resources.

In the new five-year plan period, the party requires our construction workers to radically improve the situation within our branch of industry. It is to this end that all of our efforts are directed. Our planning mechanism should move towards that end with full speed.

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CSD: 1821/088

## CONSTRUCTION

### FINANCING OF TECHNICAL RETOOLING DISCUSSED

Moscow FINANSY SSSR in Russian No 4, Apr 81 (signed to press 13 Mar 81) pp 53-56

[Article by N. P. Dobryshevskiy, chief bookkeeper at the BSSR Ministry of the Construction Materials Industry and A. M. Kuznetsov, candidate of economic sciences: "On Increasing the Role of the Production Development Fund for the Technical Retooling of Industrial Associations (Enterprises)"]

[Text] One of the sources of financing technical retooling work for enterprises is the production development fund. Its role is substantially increasing in accordance with the CPSU Central Committee and USSR Council of Ministers decree dated 12 July 1978 concerning an improvement in the economic mechanism.

At the present time a portion of the monetary resources that are intended for financing capital investments is set aside to be placed at the disposal of the most productive collectives. At the same time, at the new stage of organizing and managing industry, the level of production efficiency for operating associations and enterprises is determined by considering capital construction.

In the instructions "Concerning the Procedure for Forming and Utilizing the Resources of the Production Development Fund in Manufacturing Associations, Enterprises, Construction and Installation and Design and Research Organizations," which were approved by the USSR Ministry of Finance, Gosplan, Gosbank and Stroybank [Construction Bank] on 4 April 1980, it specifies that retooling of associations and enterprises be done by means of the above source of financing: to adopt a new technique, mechanize and automate production, modernize equipment, improve production and labor organization, improve the profitability of enterprises, etc. The expenditures required for implementing the measures during the course of realizing the yearly plans are specified to be made over and above the limit of state capital investments by means of the production development fund and deductions above those planned to this fund.

The rights and obligations of associations (enterprises), management and planning agencies in utilizing the production development fund are changing considerably. Planning and management agencies are obligated to work out summary plans for the reconstruction and technical retooling of operating production capacities in the five-year plans and to first of all secure the required material resources and volume of contract work for this type of capital investment. Enterprises have been granted the right to approve title lists for the technical retooling of capacities by means of the production development fund irrespective of the estimated cost of the work.

The above agencies are obligated, within the capital investment limits that have been set for them, to include suggestions by associations (enterprises) in the capital construction plan. Measures have been specified that will make it possible to solve the paramount national economy problem of further improving the structure of capital investments over the long term by means of increasing the relative proportion of expenditures for equipment.

Under these conditions the problem of correctly determining the size of the production development fund by starting with the optimum demands on it, of guaranteeing its formation, and of increasing the responsibility of associations (enterprises) to use the resources that have been placed at their disposal efficiently and very effectively acquires special urgency. In accordance with the new decree the production development fund will be formed by means of deductions from profits according to fixed standards, amortization deductions that are intended to completely restore fixed assets and earnings from realizing retired or superfluous assets that are counted as part of fixed assets after deducting expenses for liquidating these assets. It is also specified that a portion of the capital that is obtained from other enterprises that use its scientific and technical developments (documentation), and also a portion of the additional profit that is obtained by implementing a new highly efficient product that is for production and technical purposes or a product with the State Seal of Quality be included in this fund.

The search for an optimum relationship between the different sources that make up the total amount of the production development fund is acquiring important significance from the point of view of the economic interests of an enterprise. At the present time up to 45 percent of the amortization deductions for renovation are allocated to this fund. According to the new decree the limit is set at 50 percent. It can be assumed that with the new system for forming a production development fund the amortization deductions will preserve their leading position among the other sources. Thus, the following structure was specified for the BSSR Ministry of the Construction Materials Industry for 1980: profit--33.3 percent; amortization deductions--42.8 percent; earnings from realizing retired assets--23.9 percent. In certain associations and enterprises this ratio varies which is caused by a number of factors, chiefly by the different level of production profitability (Table 1).

As is evident from the data given the production development fund of enterprises that are planned to be unprofitable is formed only from two sources: amortization deductions (79.0 percent) and earnings from realizing fixed assets (21 percent). A significant difference in the structure of the sources of the fund is observed for profitable enterprises. For example, where there is a production profitability of up to 10 percent the relative proportion of profit in the total sum of the fund equals 31.3 percent and where profitability is greater than 20 percent it is 45.5 percent or higher by 12.9 points. The amortization deductions comprised 58.7 and 44.7, respectively.

The question may arise, what significance does this have? The enterprise is interested in the sum of the production development fund that is required for it to finance work. The monetary assets that are entered in the fund are not distinguished individually and act as the special purpose financial resources of an enterprise in the future. The capability of associations and enterprises with different levels of profitability to finance capital work for the technical retooling and reconstruction of fixed production assets from the production development fund is shown in Table 2.

TABLE 1

STRUCTURE OF THE SOURCES OF THE PRODUCTION DEVELOPMENT FUND  
FOR THE BSSR MINISTRY OF THE CONSTRUCTION MATERIALS INDUSTRY IN 1979

A Group of Enterprises with a Level of Profitability, Percent	Number of Enterprises Comprising the Group	Development Fund				Sources			
		Thousands of Rubles	Percent	Sum, Thousands of Rubles	Profit	Sum, Thousands of Rubles	Amortization	Sum, Thousands of Rubles	Earnings from Realizing Assets
Unprofitable	6	181	100	—	—	143	79.0	38	21.0
0-10.0	16	2110	100	661	31.3	1229	56.7	210	10.0
10.1-20	11	1832	100	677	37.0	867	47.3	288	15.7
Above 20.0	6	707	100	321	45.4	316	44.7	70	9.9
<b>Totals</b>	<b>39</b>	<b>4830</b>	<b>100</b>	<b>1659</b>	<b>34.3</b>	<b>2565</b>	<b>53.1</b>	<b>606</b>	<b>12.6</b>

TABLE 2

THE EFFECT OF THE LEVEL OF PROFITABILITY ON THE SIZE OF THE PRODUCTION DEVELOPMENT FUND FOR THE BSSR MINISTRY OF THE CONSTRUCTION MATERIALS INDUSTRY

Groups of Enterprises with a Level of Production Profitability, Percent	Number of Enterprises Comprising the Group	The Sum of the Production Development Fund, Thousands of Rubles	Value of Fixed Production Assets, Thousands of Rubles	Funds Needed From the Production Development Fund per 1 Ruble of Value, Kopecks	
				All of the	Fixed Production Assets
Unprofitable	6	181	45.7	17.1	0.4
0-10.0	16	2110	257.5	124.4	0.8
10.1-20.0	11	1832	161.4	62.4	1.1
Above than 20.0	6	707	67.2	25.9	1.1

From the table it is evident that unprofitable enterprises have half as many resources in the production development fund at their disposal as profitable ones when calculating per one ruble of value of all the fixed production capital and equipment (1.1 and 2.7 kopecks, respectively). The reason for the difference is contained in the very method of forming the production development fund--the relative proportion of profit and amortization deductions in its sources are not identical for enterprises with a different level of profitability. Amortization deductions depend chiefly on their action. A change in the time periods for introducing them or withdrawing them and also the value of the fixed assets are reflected in the sum of the amortization deductions.

Various factors influence profit during the process of production and management activity. At the same time many of them are not related to the use of fixed production assets but nonetheless they create the possibility of additionally forming a production development fund. When analyzing the data characterizing the structure of above plan deductions to the production development fund by 29 associations (enterprises) in the BSSR Ministry of the Construction Materials Industry with a profitability level no lower than the plan, the deviation of the earnings from realizing fixed assets is not taken into consideration since its size does not directly depend on the results of enterprises' activity and may not always be considered in the financing plan (Table 3).

As is evident from the data above plan deductions from profit to the production development fund in the fourth group of enterprises, when calculating for 1 ruble of equipment value, exceed the deductions of the second group by a factor of more than 4 and the third group by a factor of 1.7. As to the above plan amortization deductions to the production development fund, they were formed in significant amounts by only 3 of 15 enterprises and this was brought about by putting new fixed assets into use ahead of schedule. First of all, such a situation does not always arise, and secondly, the production development fund does not play a stimulating role in such instances since putting installations into operation depends primarily on construction and installation organizations.

Thus, highly profitable associations (enterprises) make considerable above plan deductions to the production development fund when overfulfilling the plan for profit while those that are unprofitable or have a low profitability are deprived of this opportunity and form the fund primarily from amortization deductions. And it is precisely they, as a rule, that put the greatest demand on the sources of financing for technical retooling.

Such a situation is considered natural since the production development fund is one of the economic incentive funds. But the production development fund, in contrast to incentive funds, is first of all a source of financing capital investments that are used for the technical renovation of fixed assets, chiefly equipment. Capital investments are distributed among the structures originating, as a rule, with the interests of the sector and the national economy on the whole out of the necessity of increasing this or that type of product to reach the level of the leading enterprises for all technical and economic parameters. This is in reference to the various levels of profitability that are caused by objective reasons not dependent on the enterprises.

TABLE 3

THE STRUCTURE OF ABOVE PLAN DEDUCTIONS TO THE PRODUCTION DEVELOPMENT FUND  
FOR THE BSSR MINISTRY OF THE CONSTRUCTION MATERIALS INDUSTRY

Groups of Enterprises with a Level of Profitability, Percent	Number of Enterprises in the Group	Above Plan Deductions to the Production Development Fund, Thousands of Rubles		Above-Plan Deductions per 1 Ruble of Equipment Value, Kopecks	
		Profit	Amortization	Profit	Amortization
1. Planned unprofitable	4	—	+ 8.4	—	0.08
2. 0-10	11	+56.3	+76.0	0.07	0.10
3. 10.1-20	8	+54.3	-17.9	0.17	—
4. Above 20	6	+78.6	- 3.1	0.30	—

TABLE 4

THE RELATIONSHIP OF THE PRODUCTION DEVELOPMENT FUND AND EQUIPMENT FOR THE BSSR MINISTRY OF THE CONSTRUCTION MATERIALS INDUSTRY

Groups of Enterprises with a Relative Proportion of Equipment in the Value of Fixed Assets	Number of Enterprises Comprising the Group	Sum of the Production Development Fund, Thousands of Rubles	Capital Required from the Production Development Fund per 1 Ruble of Equipment Value, Kopecks	
			Value of Equipment, Thousands of Rubles	Capital Required from the Production Development Fund per 1 Ruble of Equipment Value, Kopecks
Up to 35 percent	9	970	38.9	2.5
35.1-40.0 percent	12	1810	82.2	2.2
40.1-45.0 percent	11	1371	55.4	2.5
Above 45 percent	6	679	32.8	2.1

It is expedient to form the production development fund by means of amortization deductions for complete restoration not limited to 50 percent. This will make it possible to create relatively equal opportunities for all associations and enterprises to form a production development fund on a solid basis which is especially important for technically backward enterprises.

The production development fund and amortization deductions, as an independent source of financing capital investments, are very similar to each other in the nature of their use. Factors influence the level of profit that are not dependent at times on the operations of enterprises; for example, a change in the distance for supplies of raw materials, fuel and other materials or a transfer to exploiting new more remote deposits with a large amount of mining preparations and stripping work. A systematic reduction in wholesale prices for basic building materials does not play an unimportant role.

A new form of stimulating high-principled planning obligations--counter plans--is being called on to play an important role. Profit (the savings from reducing unprofitability) obtained from completing the counter plans should be distributed thus: 30 percent to the state budget's income, 20 percent to the enterprise's incentive fund, 50 percent to the production development fund. The proposed procedure will stimulate associations (enterprises) to improve the profitability of their production.

Along with the profit from completing the counter plan a portion of the supplementary profit that is obtained by an enterprise from implementing a new highly efficient product or a product with the State Seal of Quality and also a portion of the capital received from other enterprises that use its scientific and technical developments should, as is specified by the new decree, be counted in the production development fund. As a result the production development fund will be more closely related to that section which requires from each enterprise an active mobilization of internal resources, an improvement in the quality of a product, a solution to the urgent problems of scientific and technical progress and a timely adoption of them in production. The possibility of counting a portion of the planned profit in the production development fund of this or that enterprise cannot be excluded.

Along with solving the overall methodological problem of forming a production development fund such economic factors should be taken into consideration when determining its size for individual associations (enterprises) as the technological structure of fixed assets, the degree of their wear and tear, the length of service, the peculiarities of developing individual subsectors and groups of associations (enterprises), the rate of renovating equipment in accordance with the demands of scientific and technical progress, etc.

Under the existing method a majority of these factors do not take part in determining the size of the production development fund. Since the given fund is intended to finance the technical renovation of mainly the active portion of the fixed assets the capital in it should be deducted by considering the relative proportion of equipment at each enterprise which, at the present time, is not adhered to in practice (Table 4).

As is evident from the table, with a relative proportion of up to 35 percent in the total value of the fixed production assets 2.5 kopecks are needed from the production development fund for one ruble of equipment value, and for 45 percent and above 2.1 kopecks. An especially large discrepancy in the data presented is observed for certain associations (enterprises).

An analysis of the actual material has shown that there is no greater correlation between the size of the production development fund and such an important indicator as the state of fixed production assets than in the degree of their wear and tear. As a result, certain associations with less worn out assets sometimes have greater sources of financing renovation than enterprises with more worn out ones and, consequently, technically outmoded production assets.

With such a practice for forming assets where the technological structure of fixed production assets and the degree of their wear and tear are not considered the most important prerequisite for strengthening the principles of cost accounting for associations and enterprises is lost. Therefore, it is expedient to apply the sector coefficients for adjusting the standards for forming a production development fund by means of amortization deductions depending on the degree of wear and tear of the active elements (machines, equipment, etc.) and their relative proportion in the total volume of fixed production assets. At the same time enterprises with a large amount and high degree of wear and tear on the primary technological equipment will acquire a certain advantage in forming the production development fund, and, consequently, broader possibilities for the technical retooling of its capacities.

A solution to all of the problems cited cannot give a positive result if the optimum demand by each sector on the capital in the production development fund is not determined. Determining deductions to the production development fund is often of a subjective nature. Only this can explain that, while realizing the fund generating indicators, 9.3 million rubles in 1975 and 4.9 rubles in 1978, i.e., almost half as much, were entered into the production development fund for the BSSR Ministry of the Construction Materials Industry. Its amount was determined to be 2.1 rubles in 1980.

Objective and long-range criterions must be laid down as the basis of planning the size of the production development fund. In our opinion, summary plans for the reconstruction and technical retooling of enterprises, which USSR ministries and departments and the councils of ministers of union republics are obliged to draw up for each five-year plan, can serve as such a criterion.

The sum in the production development fund must also reach each association (enterprise) during the five-year plan, be broken down into years and be up to date and accurate. This will make it possible to link the plans for the technical renovation of production with financial resources and makes the plans stable and realistic when being implemented. Improving the formation of the production development fund will make it possible, in our view, to strengthen the positive effects of the economic mechanism on improving efficiency and the quality of social production.

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CSO: 1821

## CONSTRUCTION

UDC 725.4

### INTEGRATED APPROACH TAKEN TO ARCHITECTURE OF KAMA TRUCK PLANT

Moscow ARKHITEKTURA SSSR in Russian No 2, Feb 81 (signed to press 16 Jan 81) pp 32-35

[Article by Candidate of Architecture M. Krichevskiy of TsNII Promzdaniy [Central Scientific-Research and Experimental-Design Institute for Industrial Buildings and Structures]: "KamAZ [Kama Motor-Vehicle Plant]--the Motor-Vehicle Manufacturing Giant"]

[Text] The 120,000-man collective of builders, erectors, autoplant workers, architects, designers and design developers who participated in the design and construction of the Kama automotive-giant complex, after adopting socialist commitments and widely promoting socialist competition in honor of the 26th party congress, completed their labor drive of the Tenth Five-Year Plan ahead of schedule.

Back in 1976, in the days of the 25th CPSU Congress's work, the first domestic heavy trucks with the KamAZ emblem came off the automotive plant's assembly line. Congress delegates then fittingly evaluated the new KamAZ vehicles that arrived in Moscow as a gift to the congress.

Construction of the automotive industry giant gave birth to the new, modern city of Naberezhnyye Chelny, which became the largest urban-development complex of the Tenth Five-Year Plan and the industrial, cultural and administrative center of the Naberezhnyye Chelny industrial region. Development of designs for the buildup of the city and the industrial site of the complex of plants began practically simultaneously and was conducted in interdependence with the solutions to the layout of the complexes of the autoplant and other industrial facilities. The most important social task in the design and construction of the modern city of Naberezhnyye Chelny was to create conditions that were favorable to the maximum for work, everyday living and recreation of the multithousand collective of workers of the complex, of the autoplant workers and members of their families.

During all these years many of the country's organizations made their contribution to the construction of the huge industrial giant. The Leninist Komsomol took the construction under its patronage, announcing it as a Komsomol shock-work construction project. Many design-organization collectives, answering the CPSU Central Committee's call, were included in the socialist competition for a worthy greeting to the 26th CPSU Congress.

Modern, progressive method for integrating organization of the production environment, based upon the achievements of scientific and technical progress in the area

of equipment, technology and industrial architecture, were reflected in the design and construction of the automotive giant. KamAZ is the largest industrial complex for producing heavy-duty trucks, with a high degree of production concentration, and it consists of six specialized plants: the foundry, the forging plant, the tool and repair plant, the frame-pressing plant, the engine plant, and the motor-vehicle plant, at which recent achievements in the areas of domestic and world techniques and technology for motor-vehicle manufacture and for the mechanization and automation of industrial production were introduced. At the foundry, 89 percent of the whole pool of industrial machines are automated or semiautomated, and, in all, about 400 automated assembly lines have been installed in the complex's departments. The total length of the conveyor lines with the automatic devices is more than 160 km. Thus, the foundations have already been laid in the industrial-functional structure of all departments, without exception, for highly productive work and the creation of comfortable working conditions.

KamAZ has become a proving ground for advanced experience. Advanced technology and high mechanization and automation of industrial processes have been underlying factors not only in creating conditions for highly productive and high-quality work by all echelons of production personnel: they make high demands on the workers, on their educational and vocational levels. It is evident in the KamAZ example how greatly the educational level and the vocational training of workers have risen.

The designers' collectives were guided in their work by party instructions that improvement of working conditions is one of the most important social and economic tasks of Soviet industrial architecture. In organizing social processes and in creating a full-fledged "production-environment-man" system, KamAZ's designers and builders achieved great successes. The architectural and three-dimensional composition and the esthetic organization of the production, administration and personal-amenities buildings were synthesized on the basis of precise principles that consider both the "human factor" and the latest achievements in the areas of industrial architecture, construction operations and engineering esthetics: maximum interlocking of production facilities into large general-purpose buildings at unification and standardization of the main structural members; a rise in industrialization of the manufacture of structure and products and the performance of finishing operations; and the use of new and progressive materials, structure and products. Tasks most important for the designers and builders were to provide comfortable working conditions, to raise the architectural-artistic expressiveness of the "space and mass" environment with the means of architecture, design and decorative-monument art, which, in the final analysis, exert a positive influence on raising labor productivity and improving the quality of the items produced.

The main buildings of the motor-vehicle, diesel and frame-pressing plant were each designed as a single volume and are, in essence, plant shells in which all the basic production departments are interlocked under one roof. The area of development of the main shells of the motor-vehicle and diesel plants is about 420,000 m<sup>2</sup>; for the frame-pressworking building it is about 300,000 m<sup>2</sup>.

Versatility of the production buildings (within the limits of the groups of production facilities) is achieved by using unified columnar grids (12x24 meters, more rarely 12x30 meters) and building heights (8.4, 10.8 and 12.6 meters), standardization of individual constructional elements (engineering support systems, personal-amenity and office spaces, places for industrial operation purposes, and so on), and a regularized laying of arterial utility, service and communication lines. A high degree of flexibility of the spatial structure of the building interiors was



Main Building of the Motor-Vehicle Plant.

- Key:**
1. Zone of the machinery-assembly departments.
  2. Main assembly-line conveyor zone.
  3. Cab assembly zone.
  4. Storage for billets and blanks.
  5. Storage for subsidiary and auxiliary premises and for utility and service lines and facilities.
  6. Zone for outside subcontractors.

provided by the use of consolidated layout parameters for the buildings, by the creation of large spaces unbroken by permanent walls, and by siting premises for auxiliary purposes outside the main production space and grouping them in separate zones. Such a solution enables the space of the main production departments to be free of built-in spaces for engineering arrangements and the creation of multiple-purpose engineering systems with a potential for being modernized and expanded with change in the technology.

The principles of precise architectural and spatial organization of the industrial buildings can be traced more graphically in the example of the main building of the motor-vehicle plant. The building shell is 1,152 meters long, which is determined by the length of the main assembly conveyor; it is 388 meters wide, and it consists of 16 bays that parallel the building's axis, with a columnar grid of 12x24 meters, divided along the entire length by a two-story constructional insert in which spaces for the air conditioners and various secondary and auxiliary premises have been placed. In this way, the longitudinal insert divides the building's space into two parts, in one of which departments for mechanical machining and the detailed component assembly of parts have been interlocked, and in the other three lines of the main assembly conveyor and two suspended lines for cab assembly have been placed.

The layout of the main functional-space zones of the main building is a rectangular system of intradepartmental passageways and aisles, the linear directivity of which is stressed by colored indicators on the floor and by bumper devices. Zoning of the space along the uprights also is brightly expressive in nature. Thus, in the machinery departments the main industrial operating equipment zone is traced precisely from the zero floor level up to the 5-meter level, the zone for suspended transport is placed above that, up to the 8.4-meter mark, and in the spaces between the trusses are the air ducts and pipeline mains. In the bays for assembly-line production, the zone for conveyor lines and storage of outfitting articles has been placed between the zero and 5-meter levels, in the space between the 5-meter and 12.6-meter levels is the zone for suspended thrust conveyors and storage units, separated from the lower zone by reticulate screens, and the air ducts and pipeline mains again are placed in the spaces between the trusses.

The similar zonal construction along the vertical and horizontal of the structure provides for a high degree of flexibility of production relationships and creates at the same time the prerequisites for multiple-purpose use of the space. Along with this, in such a versatile building, the industrial-operation specifics of the various departments impart a structural uniqueness to each functional-space zone and provide for a diversity of points and perspectives in perception of the interior. In the functional-space zone for the general assembly of motor vehicles, the main assembly-line conveyor is the basic structure-forming element, and it is this which determines the directivity of the spatial dimension. The flow-line technology furnishes perception of the space, as a rule, along the conveyor lines in the form of an elongated open perspective, with the brightly expressed metrical construction of the truck cabs painted in various colors.

However, given such an elongated space (the assembly conveyor is about 1,000 meters long), the danger arises of the workers' getting a feeling of emptiness and monotony, which may not only reduce the effect of the architectural features of the interior but also make it difficult to become oriented within it. The designers solved this task by creating additional compositional accents within the assemblymen's field of view, using for this purpose 11 two-story spaces situated

rhythmically throughout the length of the building in a constructional insert for secondary and auxiliary premises. Within the said spaces, blocks of spaces for production-control panels were placed at the 4.2-meter grade level, as well as panels for controlling the assembly conveyors and the suspended conveyor lines. The architectural significance of these spaces in the composition of the departments' inner space required that the designers pay special attention to solving their exterior face. Thus, the walls of the stairways, from the direction of the department, were faced with travertine, the walls' asbestos-cement sheet was glued by a film that imitates valuable types of wood, and the steel framework and also the pressed steel sheet of the wall enclosure have been painted with enamel paints in deep colors. In so doing, each of the 11 blocks has its own color, which increases greatly the information content of the medium and creates good conditions for orienting people within the interior's space. The organization of the built-in premises and their siting within the interior have permitted the task of providing comfortable working conditions to be solved, since they help to bring the social and personal-amenity services and the workplaces of the large group of auxiliary workers and engineers and technicians closer to the main production facility zone. Intradepartment built-in premises for secondary and auxiliary purposes are distributed directly in the production zone throughout the whole area of the main building. They have been designed in the form of collapsible three-dimensional modules. For the foremen of departments and sections, a standard glassed-in room, 3x3 meters in plan, has been developed, which can in case of necessity be moved to any point in the department.

It is known that the industrialization of construction work, aside from the purely economic factors, exerts a positive influence on the quality of architectural solutions. For this purpose, many structural members and articles for the Kama auto-plant interior were developed to take into account maximum transference of processes for manufacturing them to construction-industry plants. All the interior closures were solved with lightweight industrially produced structure which can be easily dismounted and installed at a new place with minimal expenditure for rebuilding. For production spaces, architectural and constructional solutions were developed for one-story built-in spaces for various purposes, which are made of separate factory-made panels with steel-tube framework and fleshed out with various large-dimension materials.

Because of the colossal amount of construction at KAMAZ, a problem in doing the finishing work arose. The solution was found of doing this work at construction-industry plants to the maximum extent and of using basically the newest large-dimension sheet and film materials. Thus, for facing walls and columns, painted formed steel and asbestos-cement sheet, washable insulation-film wallpaper, veneered particleboard, self-sealing polyvinyl chloride film, paper-based laminated plastic and shaped glass, as well as marble, travertine and limestone facing sheet, were used. Slab of enlarged size, made, as a rule, of pressed drytrified slag glass, steel plates, mosaic concrete slab based on colored cement, large ceramic tiles, and butt-end wood blocks were used to cover floors or as flooring. For suspended ceilings, wide use was made of aluminum plate and perforated acoustic steel and gypsum panels, and of ceilings made of aluminum sheet, in which case the suspended ceilings were, as a rule, installed with modules made of enlarged panels. Enamel paints were used in the interiors of production buildings for painting metal constructional structure, water-based paints for concrete and plaster surfaces.

The architectural expressiveness of the interiors is determined greatly by the engineering esthetics treatment of the constructional members and articles that people come in direct contact with during the work process: the sash of windows, gates and doors, devices for opening, and so on. For production buildings, new structure for window sash, equipped with manual and pneumatic devices for opening, were developed and introduced. New structure for shutter-type, lifting-and-rotating, double, and rolling gates, and also for doors, are distinguished by simplicity, starkness and proportionality of shape, and, the main thing, they incorporate a unified stylistic origin.

Use of the newest systems and models of engineering and sanitary-engineering equipment was one of the determining factors in creating a rational three-dimensional structure for the buildings and in providing comfortable working conditions. The regularized siting of elements of the sanitary-engineering systems, with air conditioners of maximum productivity and the modular installation of air delivery ducts, networks of heat carriers and other sanitary-engineering lines, created the pre-requisites for functionally precise zoning of the space. Grouped circular wash stands with pedal controls, restroom booths with floor-model toilet bowls, shower stalls with individual compartments for changing clothes, footbaths, and certain other plumbing devices and structure that provide for the rational solution of layout tasks and the creation of comfortable sanitary and hygienic conditions, were used widely in the interiors of administrative and personal-amenity premises.

The necessity for creating a comfortable physical and material environment today is dictated by the increasingly wide mechanization and automation of production processes of motor-vehicle manufacture and by the complication of man's functional role, where there is a set rhythm of work on the conveyor. Among the factors that help to create comfortable working conditions, along with the construction of rational three-dimensional structures, considerable importance is given to personal-amenity services, a color scheme for production-facility interiors, and the organization of places for work breaks, as well as the use of a system for visual communication and the resources of decorative-ornament art.

Personal-amenity services at KAMAZ are concentrated, as a rule, at freestanding three-story administrative and personal-services buildings that are joined to the production-buildings by underground or surface passageways, enabling zones to be laid out and comfortable conditions to be created in the interiors in the best way possible, particularly in the matter of illumination and ventilation. In ARZ's [administrative and domestic-amenity buildings] cloakrooms have been placed on the first and second stories, and halls for meetings and office space on the third floor, and groups of premises for social eating have been designed for separate one-story buildings.

The interiors of the premises for the entry group were solved in the form of large spaces with two rows of windows, with open stairways placed symmetrically relative to the entrance. Decorative plantings and visual propaganda elements have been included in the three-dimensional layout composition of entranceways and halls. The designers' striving to consolidate separate units and zones for auxiliary spaces was expressed in the architectural-spatial organization of the interiors of the premises for social eating, the precise layout structure of which provides for rapid and convenient accommodation and creates a perception of free space flooded with light. Much attention was paid to solving the interiors of the spaces for administrative purposes, particularly of meeting halls—high-quality decorating materials as well as built-in luminaires and modern, soft furniture were used in their architectural solution.

Color is one of the important means for harmonizing the architectural composition with the industrial interior. The color solution is called upon to perform primarily functional tasks--to help create optimal conditions for visual work, to support work safety, and to raise the information content of the production environment. This is why different color selections were adopted for the interiors of the main buildings: the color range is warm in the main buildings for the tool-and-repair, motor-vehicle, diesel and frame-pressworking plants, which helps to sustain a high emotional tone for the workers and to provide for readaptation of vision; in the foundry and the forge building the color range is cool, which helps to neutralize the unfavorable working environment. High luminosity in painting surfaces in a vicinity enables maximum light reflection to be obtained in the interiors. The coloration of the main surfaces of the industrial equipment has been taken from the zone of physiologically optimal colors within the green and blue-green shades.

Functional 'air' with the use of saturated signaling colors on members of constructional structures, industrial operations equipment and transport facilities--distinctive colors for identifying pipelines--were used widely in production-building interiors. This promotes work safety and increases the informativeness of the mass medium. The integrated nature of the color solution of interiors helped to amalgamate into a unified coloration ensemble such diverse objects of the production environment as elements of architecture and technology.

In order to maintain high human efficiency in the environment of a prescribed work pace during conveyorized operations, short breaks are stipulated during the shift in KamaZ's main departments. In this connection the architectural organization of rest spots, which should be distinguished by special compositional and coloration solutions and thereby promote the relief of fatigue, acquires special importance. In the autoplant's main building these places have been designed in a constructional insert by the exits from the pedestrian passageways near the production-control spaces. This is free space, not closed off from the arterial passageway, and is equipped with benches, tables and built-in closets, as well as vending machines for beverages and sandwiches. The walls of the space are faced with decorative aluminum strips and a suspended ceiling with built-in luminaires made of akmigran, and the composition of the interior includes displays for visual propaganda and information, decorative plants, and works of the graphic arts.

It is the designers' job to organize the production environment in integrated fashion--by means of architecture and engineering esthetics. In solving the problem of a harmonious and esthetic full-fledged production environment, the need arose to develop an integral system that would permit the most diverse design studies to be carried out and to obtain, as a result, from separate elements of the mosaic, an integrated picture that answers the concept of a unified style--a company motif of the KamaZ Association.

An integrated program of a company style in the production sphere calls for the development of a unified system of visual communication that will promote a rise in the information content of the whole mass-and-space environment, which is subdivided into two subsystems: a means of orientation and a means of information about work safety. A multiple-stage subsystem of means for orientation, developed on the principle, "from the general to the particular," calls for nine groups of informational objects that are placed on the grounds and in the interior of production and administrative and personal-amenity buildings. The subsystem of the means of



#### Subsidiary and Auxiliary Premises Zone in the KVTs [Building for Auxiliary Departments] of the Tool and Repair Plant

Information about job safety practices includes the development and establishment of four groups of production safety signs that promote accident-free and safe operation by production personnel. It should be emphasized that the solution of all informational objects with use of unified harmonious shape and compositional principles and a unified modular dimension system, as well as a company coloration and typeface, creates a definite company style for the whole system of visual communication that is characteristic for KamAZ.

The synthesis of architecture, decorative-monuments art and design is manifested more completely in the architectural and spatial organization of the grounds and the buildup of the industrial complex. The integration and artistic expressiveness of the overall theme are determined by unified principles of harmonious shape and spatial composition, and a unified thematic-subject format for shaping the whole ensemble, as well as the unity of the color solution. The design calls for the installation of five sculptural architectural monuments at the main layout components of the complex's grounds, as well as of individual sculptural monumental shapes emblematic of the plants in the areas of arterial thoroughfares of the main buildings. These elements form in the field of view of the observer, when he perceives the grounds from a great distance, singular harmonious landmarks that help to organize the space and integrate the separate parts of the architectural and sculptural composition into a unified artistic ensemble. When perceiving the build-up site at close range, as in a scenic still shot, the role of architectural accents is assigned to harmonious pictorial compositions, which are placed either on the building's facades or on free-standing structures, taking into account the schedule of people's movements. In pedestrian-traffic zones, at plant thoroughfares, and at entrances to administration and personal-services buildings, small architectural shapes, flagpoles and visual propaganda and information



Interior of the Heat-Treatment Department in the Set-up Building of the Forging Plant (upper photo).

Interior of the Set-up Departments Buildings of the Forging Plant (lower photo)

displays are called for. In places for work breaks that are located in the open air, the arrangement of decorative walls, flower urns and other small architectural shapes and objects of design are specified, along with the arrangement of various squares.

The construction of the Kama automotive giant is entering the concluding phase, but work to create an integrated production environment with the involvement of a synthesis of the arts will be continued, even when the complex of plants is in operation. However, already today it can be ascertained that the integrated approach to the design and introduction of modern principles of architectural organization for production, administration and personal-services buildings permit an environment to be created that satisfies to a great degree the functional, architectural, constructional and esthetic demands of the day, with a potential for it to be modernized and improved in the future.

Design organization specialists engaged in the design of the Kama autoplant, and the city of Naberezhnyye Chelny successfully completed on schedule the development of the design and budget-estimating papers. They are proud that they took an active part in erecting the giant complex, carried out an important task with honor, and make their contribution to the successful accomplishment of the 25th CPSU Congress designs for the 10th Five-Year Plan. All production collectives are struggling to complete fully construction of the automotive giant on the Kama and to start it up at full design capacity, dedicating their labor to the 26th CPSU Congress.

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## CONSTRUCTION MACHINERY

### APPLICATION OF ROBOTS IN INDUSTRY DISCUSSED IN INTERVIEW

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[Interview with K. Chernyayev, acting director of the USSR VDNKh by S. Pinchuk and O. Robinov: "Clearly and Graphically About the Motherland's Successes"; date and place not specified]

[Text] The 26th CPSU Congress is indeed an event of historical significance. Its work has aroused great interest in the world. The resolutions of the highest forum of Soviet communists have become a program of action for all of our peoples. The report by the CPSU Central Committee to the 26th Party Congress, at which comrade L. I. Brezhnev spoke, is a remarkable document of creative Marxism-Leninism.

Today the resolutions of the 26th CPSU Congress are being broadly propagandized among the masses. The Exhibition of USSR National Economic Achievements (VDNKh) made a large, significant contribution to this work. Its collective sees its job as showing even more clearly the fruitful activity of the party, the remarkable achievements of the Soviet people, the rich experience of the leading workers of the all-union socialist competition.

Our freelance correspondents S. Pinchuk and O. Robinov went to Acting Director of the USSR VDNKh K. Chernyayev, asking him to speak about the work of the country's main exhibition after the 26th CPSU Congress.

[Question] What are the leading trends in the propaganda about the resolutions of the 26th CPSU Congress at the USSR VDNKh?

[Answer] The party's plans, which it determined at the 26th Congress, are the basis of the thoughts for all the work at the exhibit. Such Leninist principles of propaganda are contained in our activity as: party spirit, being on the offensive, and urgency. While setting the tasks for the eighties, the party is ensuring the continuity of its economic policy. A further increase in the well being of the Soviet people, as is well known, has been determined to be the main task for the 11th Five-Year Plan based on a steady, progressive development of the national

economy, an acceleration of scientific and technological progress and the transition of the economic structure to an intensive method of development, a more efficient utilization of the country's production potential, economizing all kinds of resources in every way possible and an improvement in the quality of work.

It is precisely these problems that are being reflected in the expositions of a majority of the pavilions at the USSR VDNKh. I will illustrate what was said by the example of the "Machine Building" Pavilion. Its stands tell of the fact that now the proportion of machine building comes to more than one quarter of the products manufactured in the USSR and almost one-fifth of the country's exports, that the Soviet Union occupies first place in the world for producing diesel and electric locomotives, tractors, agricultural and several other machines.

Such a figure, for example, is impressive: during the 11th Five-Year Plan the output of machine building and metal working products will increase by a factor of no less than 1.4. An unprecedented development of machine tool building is envisaged.

But today, certainly, it is not only quantity that determines technological progress. Problems of increasing labor productivity and improving the quality of work are being brought to the fore in the main plan. They are being solved by means of mechanizing and automating the technological processes of production where a group of machine tools and automated and transportation installations are linked together in a single system while control over them is assigned to an EVM [electronic computer] and often to a whole complex of "intelligent" machines. In this regard I wanted to stop at two interesting expositions in the "Machine Building" Pavilion.

About 300 natural specimens, models, mockups, topographic maps, movie films, posters and turnstiles are presented at the "Inventions in the Sphere of Mechanizing and Automating Production Processes Exhibition." The "Machine Building" department in it is the largest. And this is understandable. For the role of machine building in the development of the national economy and in raising labor productivity cannot be compared with anything. Among the exhibits of the department are a device for testing components for strength. It provides reliable control over the quality of the articles.

The automated finishing of articles that do not pass the tests is also provided here. The speed of testing is increased by a factor of 5 to 10 depending on the nature of the parts. The annual economic effect of the machine exceeds one million rubles.

Another exhibition that is operating in the "Machine Building" Pavilion is "The Best Models of Automated Manipulators." It was formed in accordance with the CPSU Central Committee Decree "Concerning Measures for Increasing the Production and Broad Application of Automated Manipulators in the Sectors of the National Economy in Light of the Instructions of the 25th CPSU Congress."

The role and significance of this exhibition is difficult to overestimate. It is no secret that at many enterprises such labor-consuming operations as placing blanks on machine tools and removing finished components, laying the finished product in a package, feeding sheet blanks into the puncher and adjusting the tool, etc. are not automated. All of this significantly reduces the productivity of technology and requires a large number of workers who are engaged in monotonous, fatiguing labor.

Consequently, the problem of introducing industrial robots is not only economic but social as well. The exhibition shows how this problem is being solved today and tells about the numerous "specialties" of automated manipulators. Here are only several examples from its exposition.

At the motor vehicle plant imeni I. A. Likhachev a robot replaces manual labor on the presses; it punches out flat components at the L'vov Production Association imeni V. I. Lenin; robots are engaged in transportation and loading operations at the Leningrad carburetor fittings plant imeni V. V. Kuybyshev, and they serve 250 ton punchers at the "Kirovskiy Plant" Association. At "Uralkhimmash" manipulators "work" with components weighing up to 100 tons, in Donbass they are mastering the profession of miner, at the Gor'kiy motor vehicle plant that of welder, at "Kraslesmash" that of painter. In Krasnoyarsk kray an intersector "Siberian robot" program was prepared. Its implementation will make it possible to put about a thousand manipulators into production.

At the exhibition one can become acquainted with robots that have been given the elements of an artificial intellect--they are capable of "seeing," "hearing," "understanding," and even "evaluating" complex situations. The terrestrial brothers of the moon walker are also presented--automaton explorers.

Large departments have been set aside in the pavilion for the development of the motor vehicle industry, instrument making, improving the economic mechanism in the sector, and long range research for strengthening science's ties with production.

[Question] Tell us, please, how machine building for the food and light industries is exhibited at the USSR VDNKh. For this sector is justifiably called "machine building for millions."

[Answer] At the 26th CPSU Congress, Leonid Il'ich Brezhnev said that the expansion of production, an improvement in the quality of consumer goods and the development of the spheres of services are becoming of paramount importance for further improving the welfare of the Soviet people. And the quality of the goods that are in demand by the masses depends most of all on the equipment on which they are manufactured.

The exhibition "New Technology for the Food and Light Industry, Printing, Trade and Everyday Services" was a success at the USSR VDNKh. Its exposition gave a visual presentation of the broad range of products that are turned out by the sector.

Machine tools and machines with the brand name of plants in the Ministry of Machine Building for Food and Light and Food Industry and Household Appliances are operating at bread, meat and milk plants, at textile, sewing and shoe factories in storage elevators and mills, in cafes and in stores, restaurants and cafeterias. They have also been installed in printing houses, in the shops of glass plants and on board fishing vessels. Practically every family has "mechanical helpers." These everyday devices are very popular with the population.

The number of items of the principal technological equipment that is turned out by the sector now comprises 4,500. They are supplied to enterprises in more than 60 sectors of industry in which more than 17 million people are employed. There are another 1600 types of products--goods for cultural and everyday purposes and domestic use.

The exhibition's stands told how in order to develop the sector during the 10th Five-Year Plan the most characteristic feature was increasing the individual capacity of equipment and forming flow lines and systems of machinery. This not only makes it possible to significantly increase labor productivity in the sectors that are served and improve the level of automation and mechanization for labor-consuming processes but also aids in efficiently using natural raw materials, reducing their loss during processing and increasing the quality of the product that is obtained.

Machine builders are giving much attention to improving labor conditions and are striving to reduce noise and dust in the shops of textile enterprises, etc. The aim of this exhibition is not only to sum up what was done during the 10th Five-Year Plan. Models of machine tools and machines whose serial output is being started in the years from 1981 to 1985 are also included in its exposition. Many exhibits are shown here in operation and functioning.

[Question] It is not difficult to notice that the "Metallurgy" Pavilion arouses increased interest today among the visitors to the USSR VDNKh. What is characteristic of this exposition?

[Answer] First of all I would like to speak about the collectives that are represented here, for example, the Donets chemical and metallurgical plant. Its workers completed the programs for the 10th Five-Year Plan by 17 December of last year. The country obtained a supplementary amount of cast iron, steel and finished rolled metal. A significant savings in energy resources was achieved.

The Noril'sk Mining and Metallurgical Combine imeni A. P. Zavenyagin is represented in the pavilion. Year in and year out it is increasing the amount of ore extracted and the amount of non-ferrous metal produced. During the past five-year plan the combine realized 10 million rubles worth of products above the plan. The entire increase was obtained by means of improving labor productivity.

The pavilion's exposition, reflecting the sector today, shows its future as well. Units with large individual capacities are the basis for the modern technological reequipping of metallurgy. It is precisely this that made it possible, for example, for the slabbing mill collective of the Magnitogorsk combine to be the first in world practice to roll 7 million tons of billets. And the collective of the double bath steel smelting furnace No 35 smelted a record amount of steel--1.6 million tons. All of the steel mills in Magnitka provided the same amount in 1940.

The economic structure must be economical--such is the demand of the times. These words, which resounded at the 26th CPSU Congress, also fully relate to metallurgy--the foundation of all of the country's industry. They became the leit motif of the thematic exhibition "Advanced Expertise of Non-Ferrous Metallurgy Enterprises for Reducing Metal Consumption." Good results were achieved along these lines in all sectors of metallurgical production.

Economizing metal enables a system of automated control over laying out patterns to be adopted in rolled metal shops. For example, adopting it at the Dneprovskiy Metallurgical Plant imeni F. E. Dzerzhinsky, made it possible to significantly reduce metal waste.

[Question] In what other pavilions are the problems of thrift and economy reflected?

[Answer] Practically in all. But I will stop at one very important intersector exhibition in the "Electrification of the USSR" Pavilion which is devoted to economizing fuel and electric power in the national economy.

The following fact tells of the importance and significance of this exposition. At present more than 700 million tons of mineral fuel is consumed annually for producing electrical and heating energy. A savings only in the range of 0.1 percent saves 700,000 tons.

Much space is given in the exposition to the creative collaboration of innovators of enterprises and scientists of scientific research organizations and to the results of their joint work that is related to improving technological processes. For example, fuel consumption was reduced by 20 percent and electric power by 15 percent at the Zhdanov Metallurgical Plant imeni Il'ich just by means of repairs for the thermal furnace. The furnace's output increased by 15 percent. A conveyor device for drying articles with a paint and varnish finish was introduced at the Riga Lighting Engineering Plant. By means of increasing the productivity of the dryer a savings of 21.7 million kilowatt hours of electric power are saved annually.

The expertise of the collectives of the Magnitogorsk and Cherepovets combines, the Volkov aluminum plant, the Novopolotsk petroleum refining plant and others at using secondary energy resources is revealed at the exhibition.

We will stop at the exhibition, called, in the popular words of Lenin, "Communism--this is Soviet power plus electrification of the entire country." Scale models of power stations are presented here and their technological and economic indices testify to the increasing pace of scientific and technological progress in the field of electrical power. Visitors will learn with pride that now our country occupies a leading position in the world for such indices as the relative consumption of fuel, the individual capacities of units, the voltage levels of the electrical networks and the scale of the heating systems.

Heating stations comprise the foundation of power engineering. A scale model of the Berezovo GRES-1--the main one in the Kansko-Achinsk fuel and power complex--is exhibited in the pavilion. Its design capacity is 6,400 megawatts. A model of a unique unit with a capacity of 1200 megawatts, which has been installed at the Kostroma GRES, attracts the attention of visitors. Almost the entire capacity of the GOELRO [State Commission on the Electrification of Russia] station is "contained" in one unit.

Up in the pavilion shows the new construction for the 11th Five-Year Plan in various colored lights. Construction of the Sayano-Shushenskiy GES with a capacity of 6,400,000 kilowatts will be completed. Such large stations as Nizhnekamsk, Kolymsk and Cheboksary--the last in the Volga cascade--will come on stream.

A special section is devoted to atomic energy. During the upcoming five-year plan it will be developed primarily in the European part of the country. Figures show that by the end of 1985 the growth of capacities at the countries AESs will be almost double what it was during the 10th Five-Year Plan. The Kalinin, Zaporozh'ye,

**Khmel'nitskiy, Rostov, Balakovo and other AESs** should produce their first current. Work relating to the development of fast neutron reactors and to the use of nuclear fuel for generating thermal energy is continuing.

[Question] During the 11th Five-Year Plan crucial tasks stand before workers in the chemical and petrochemical industries. Thus, for example, the production volume of its products alone should increase by 30 to 33 percent. How is the advanced expertise of Soviet chemists presented at the USSR VDNKh?

[Answer] An intersector thematic exhibition "Scientific and Technological Progress in the Sectors of the Chemical Industry" is in operation in the "Chemical Industry" Pavilion. Dozens of enterprises and organizations in the ministries of the chemical, petrochemical, pulp and paper industry and chemical machine building are taking part in it.

Special attention is being given in the exhibition to the development of the foundations of the sector. The achievements of science in developing a raw material base and ways of solving technical, technological, and organizational-management problems are extensively shown. One of the striking examples is the experience of the work of the collective of the Moscow "Mashinostroitel'" experimental plant. One hundred and seventy addresses--from the Carpathians to Zabaykal'--such is the geography of the enterprise's contacts and deliveries. Its products determine scientific and technological progress in chemical and petroleum machine building and in the development of petroleum and gas fields; it serves the giants of large-scale chemistry.

The method of work of the sector's flagship is a school of skillful management and the scientific organization of work. Here the percentage of products that are turned over after the first presentation exceeds 97 percent.

One can learn about the technological innovations that are turned out by "Mashinostroitel'" at the exhibition. These are, for example, an automated manipulator for loading blanks into punches and machine tools and an automated device for controlling the quality of welded connections.

And there is something else that arouses unquestionable interest among visitors and that is the consumer goods with the plant's trademark. During the past five years the capital's enterprise doubled the output of these products and is planning for their further growth.

[Question] The party is analyzing the further development of the agroindustrial complex and the transformation of agriculture into a highly developed sector of the economic structure as a matter of primary importance. What is especially attractive at the agriculture section of the USSR VDNKh?

[Answer] The exhibition reveals the main trends in the development of all sectors of agriculture. At the same time emphasis is undoubtedly laid on the main problems: intensifying production, its specialization and concentration, increasing yields and productivity, mechanization, land reclamation and the introduction of chemical processes, the expertise of the leading husbandries, etc. At present, for example, the intersector exhibition "Industrial Technology and New Techniques in Agriculture" is

in operation. The rates at which agriculture and livestock breeding are being technologically reequipped are shown at stands and on diagrams.

Soviet machines are demonstrated in the pavilion--from the plough, the harrow and the flat plowshare to powerful tractors and highly productive combines. The technology is grouped by purpose and sector subdivisions. The main goal is illustrated: to implement the complete mechanization of producing sugar beets, cotton wool and flax, of introducing organic and mineral fertilizers into the soil and of using agents for protecting plants, and to significantly increase the level of mechanization for producing vegetables, potatoes, fruits, feed and the products of livestock breeding during the forthcoming five-year plan. The exhibition reflects the advanced expertise of mastering progressive industrial technology and shows their great efficiency.

Among the innovations presented are a "Sibiryak" SKD-6 grain harvester. The operating elements of this machine are capable of allowing 6.3 kilograms of grain substances to pass through per second. The first 100 new "Sibiryaks" were manufactured by Krasnoyarsk combine builders for the opening of the 26th Party Congress.

The 170 strong DT-755 caterpillar tractor arouses great interest, which can sow up to 240 hectares of plowed fields in a shift.

The exposition tells of the mighty reserves of fertile soil and about how the CPSU Central Committee and USSR Council of Ministers decree "Concerning the Formation of a Single Specialized Agrochemical Service in the Country" is being realized today. It would not be without interest to note that today people are committed to using mineral fertilizers for approximately one-fourth of agricultural products.

Much attention is also given in the exposition to the advanced expertise of using organic fertilizers. Husbandries in Belorussia, for instance, introduce 13 to 14 tons of it per hectare of plowed land. Thanks to this the yield for a number of agricultural crops almost doubled in the republic.

Intensifying agriculture presupposes a close interrelationship of science with practice and actively involving many material, technical and technological resources in production. And the pavilion's exposition reflects this. For example, visitors may acquaint themselves with the far reaching program for irrigating and draining land in the "Land Reclamation and Water Resources Management" Pavilion.

A special pavilion at the USSR VDNKh is devoted to the notable successes in producing grain. A prominent place in the exposition has by right been set aside for the bread granary--Kazakhstan. With the example of the husbandries that have a high level of cultivation ways are revealed of intensifying grain husbandry and increasing the yield of arable land. Mastering, for example, the windbreak system of agriculture in the virgin soil of Kazakhstan determined the republic's labor success. The 10th Five-Year Plan was especially bountiful for it. More than 81 million tons of grain, or almost a billion poods per year on the average, filled up the state granaries. The plan was overfulfilled by 233 million poods. This one supplement alone exceeds the amount of grain which the country obtained from Kazakhstan in the years preceding the development of the virgin land almost by a factor of three.

The figures in the Principle Directions determine the future days of our arable land: "To increase the average annual production of grain to 238 to 241 million tons including leguminous crops to 12 to 13 million tons. To increase production and purchases of millet, buckwheat, rye, rice, hardy and strong varieties of wheat, barley used in brewing beer, corn and cereal crops." The stands comment in a way on the projected limits. Agronomists are aiming at an average yield of up to 20 quintals of grain from a hectare for the country during the forthcoming five-year plan and in such rayons as Severnyy Kavkaz, Ukraina, Moldaviya, Belorussia, Pribaltika and several others--up to 35 to 40 or more quintals from a hectare. By 1990 it is projected that up to a ton of grain will be gathered when estimating for each resident of the country.

Naturally, such a topic as "field-plant" does not escape notice at the exhibition. Our country's agriculture is expanding and broadening relationships with related sectors more all the time. A vivid example is sugar beet husbandry and the sugar industry. An exposition in the "Technological Husbandries" Pavilion shows this by the example of sugar beet workers and workers in a sugar plant in Yampol'skiy rayon and Vinnitskaya oblast who laid down a unified overall plan of harvesting, carting away the harvest and processing it as the basis of their activity.

The new idea is spreading and being developed in other spheres of the agroindustrial complex. It is organically a part of the system of purchases, transportation, storage, processing and sale of food products. And in the final analysis all of this comprises a special food program.

A large amount of space is set aside at the exhibition for livestock breeding, its improvement and development. Scale models of livestock facilities and fattening fields that were built according to modern designs are presented in the pavilions. In particular, portions of the "Shchapovo" experimental complex estimated to hold 2000 cows, and the "Kuznetsovskiy" sovkhoz combine for 108,000 head of swine are exhibited.

A large section has been set aside for the livestock breeders of Ryevskaya Oblast. Their method, as is well known, was approved by the CPSU Central Committee. During the last decade longhorn cattle increased by a factor of one and a half in the oblast. Specialized enterprises produce four-fifths of all pork. Two-thirds of the poultry meat that is produced is concentrated at four poultry plants.

The extensive exposition of the "Livestock Breeding" Pavilions tell about the expertise of the winners of the socialist competition for increasing efficiency and the quality of work and about the leading husbandries and innovators of the oblast.

[Question] Seven hundred and thirty-six of the country's best collective--the winners of the All-Union Socialist Competition were entered on the All-Union Honor Board at the USSR VINKh. How is their expertise propagandized in the pavilions?

[Answer] Socialist competition is the living creativity of the masses. By its very essence it is based on the high level of conscientiousness and initiative of the people. It is precisely this initiative, as was noted at the 26th CPSU Congress, that helps to uncover and put into action production potentials and improve efficiency and the quality of work. This is why the expertise and achievements of the collectives

who were the winners of the socialist competition are presented in all the expositions of the USSR VDNKh. And many of them are wholly devoted to thematic exhibitions.

One of them is in operation in the "Potatoes and Vegetables" Pavilion. It illuminates the activities of the "Moskovskiy" sovkhoz combine which was entered on the All-Union Honor Board five times during the 11th Five-Year Plan. This specialized and highly profitable operation, which is the largest in the country in area of ground covered, is well known to residents of the capital by its products. It supplies Muscovites with fresh vegetables during the winter and early spring.

Other leading labor collectives are vividly presented at the USSR VDNKh as well. But we, obviously, do not plan to stop at this. At present, when socialist competition is extensively spreading among the country's labor collectives to improve efficiency and the quality of work, to accelerate scientific and technological progress, and to successfully complete and overfulfill the programs for the 11th Five-Year Plan, the USSR VDNKh sees its task as revealing the achievements and expertise of the right wingers of the socialist competition more vividly and extensively. The CPSU Central Committee, USSR Council of Ministers, VTsSPS [All-Union Central Council of Trade Unions] and VLKSM [Komsomol] Central Committee decree "Concerning the All-Union Socialist Competition for Successfully Completing and Overfulfilling the Programs of the 11th Five-Year Plan" is also directing us towards this. It directly points out that the USSR VDNKh must strive to extensively spread the expertise of the winners of the competition and improve the demonstration of it in the sector pavilions. And the collective of the Country's Main Exhibition is filled with determination to complete this crucial and esteemed task of the party with honor and in the best manner.

(Question) Readers of our magazine are interested in how visual means of propaganda are presented at the USSR VDNKh.

(Answer) The exposition devoted to the party's policy in the sphere of the economic and social development of Soviet society arouses much interest at the exhibition of political posters and books "The Plans of the Party are the Plans of the People." Posters, books, brochures and other publications reveal the party's methods of managing industry, construction, transportation and agriculture.

Much attention was given in the exposition to the right wingers of the socialist competition, to the heroism of the workdays of the collectives, crews and enterprises and to propaganda about advanced expertise. A special stand tells about comrade L. I. Brezhnev's meeting with the initiators of the stakhanov movement, about the foremost people and innovators of production, and about the State Prize laureates. Series of portraits are presented here: "The Guards of the Working Class," "This is as if I'm doing it for you comrade," a series of graphic portraits of the foremost people in the Western Siberia petroleum and gas industry, posters and photographs that tell about the construction workers of BAM, etc.

A series of posters and books are extensively presented which concern the further development of the industrial power of the motherland, increasing efficiency and the quality of work, improving the economic mechanism, saving energy resources and materials at each workspace, and strengthening organization and discipline.

Among the exhibits are a number of publications devoted to a war theme. A poster about the cooperation between the armies of the member nations of the Warsaw Pact and a selection of materials on the patriotic education of Soviet youth attract attention.

We realize that crucial tasks have been placed before us during the 11th Five-Year Plan. The USSR VDNKh, true to its glorious traditions, will be an active propagandist of advanced expertise in the future as well and will ever more vividly and convincingly show the selfless labor of the Soviet people--the builders of Communism.

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## METALWORKING EQUIPMENT

### PROBLEMS WITH ROBOT APPLICATION DISCUSSED

Minsk ZVYAZDA in Belorussian 15 May 81 p 2

(Article by U. Narkevich: "Robot Knocking at the Door")

[Text] The time is long since past when the word "robot" was encountered primarily in science-fiction literature. Today automatic manipulators are permanently at work at many industrial enterprises. They successfully replace man in unhealthy and hazardous industrial activities and in the most laborious and monotonous industrial operations. Prospects for the future of robots are exceptionally large. "Truly revolutionary possibilities," it was stated at the 26th CPSU Congress, "are opened up by the development and adoption of miniature electronic control devices and industrial robots. They should be employed as extensively as possible."

Ways to achieve further development of products pertaining to designing, building and utilizing automatic manipulators will be examined at the Second All-Union Conference on Industrial Robot Systems, which is convening today in Minsk. On the eve of this conference the editors of the newspaper ZVYAZDA held a round-table discussion at the Minsk Radio Engineering Institute, which is one of the organizers of this conference. Moderator of the round-table discussion was Doctor of Technical Sciences Professor I. I. Leonovich, BSSR Deputy Minister of Higher and Secondary Specialized Education, and chairman of the ZVYAZDA Public Council on Science.

Participants in the discussion included Candidate of Technical Sciences Professor V. M. Ilyn, rector of the Minsk Radio Engineering Institute; Candidate of Technical Sciences Docent S. V. Luk'yanets, pro-rector of the Minsk Radio Engineering Institute; Doctor of Technical Sciences Professor N. I. Khutski, department chairman at the Belorussian Polytechnic Institute, chairman of the Republic Council for Coordination of Work in the Area of Development and Adoption of Industrial Robots; Doctor of Technical Sciences Professor V. M. Artsen'yev; A. M. Tsitou, enterprise official; Doctor of Technical Sciences Professor V. L. Ankhimyuk, department chairman at the Belorussian Polytechnic Institute; Candidate of Technical Science Docent U. P. Kuznyatsou, department

chairman at the Minsk Radio Engineering Institute; S. A. Balayeu, deputy chief engineer at the Minsk Timepiece Factory; and V. U. Byarozavik, head of the scientific research group at the BSSR Academy of Sciences Institute of Industrial Cybernetics.

The scientists and industry officials immediately defined the topic of discussion -- problems in the area of increasing labor productivity on the basis of robot technology. And this is understandable, for precisely robot technology should serve as the basis for automation of production activities. There are still a great many difficulties and unresolved questions, however, in this important area. Not everywhere have people learned to work with robots and to utilize them with maximum return. And the automatic manipulators themselves "do not know how to do" many things at the present time. What were the main problems specified in this area?

First of all, at the scientific level. The participants in the round-table discussion noted that although there are dozens of models of industrial robots currently in use, there is as yet no unified theory of robot engineering design. Now, for example, should a robot be arranged? What basic criterion should be adopted -- a manipulator's productivity or, let us say, its cost? Or perhaps its general operating reliability? Today these questions stand somewhere at the fifth level of importance, but they should be of primary importance, for errors in this area will be too costly tomorrow, when robots are in mass production. There is also an urgent need for a precise methodology of automatic manipulator testing and research.

Today many organizations are working on developments in the area of robot technology, but each of them is working on its own, with consideration only of its own capabilities. And yet the goals of such projects are fairly often identical. In view of the fact that today robots are "popping up like mushrooms after the rain," one must also consider the other side of the coin -- are we not paying too great a price for the fact that many investigators keep "inventing the bicycle" over and over? Can things be done otherwise? Unquestionably they can! One positive development is that they have now begun compiling catalogues of industrial robots as well as separate robot modules and assemblies.

This trend must be expanded to the greatest extent possible, arranging for classification and centralized supply of requisite robot technology documents for all interested organizations.

But it is also necessary to go further. It is essential to delineate the areas of activity of different establishments, so that they concentrate their efforts in concrete sectors of one overall project. New research manpower should also be enlisted. The thought was expressed, for example, that the BSSR Academy of Sciences, with the exception of the Institute of Industrial Cybernetics, is not involved in robot development. And yet there is plenty of work in this area for many institutes of applied physics specialization. In the area of computer technology there has long since been established a unified computer system. It is also necessary to focus on development of a unified system of robots. A program is presently being set up in this republic dealing with development of robots during the 11th Five-Year Plan. It should help solve some of the problems mentioned above. But there are difficulties here as well. For example, a study of enterprises pertaining to the appropriateness of application of robots is being poorly conducted. Without possessing a full picture, it is difficult to specify bottlenecks and to determine future prospects in this complex matter.

Coming years, for example, will be years of total mechanization and automation. While in the past these truly revolutionary changes applied to mass production, now they are also involving small-series production. Of course the process of automation proper, however, will not take place automatically, as some people think. Here too, noted the participants in the round-table discussion, experience gained in adopting automated control systems can serve as a good lesson. Unusually high hopes were placed on automated control systems 10 or 15 years ago. It was believed that with the aid of such systems it would be possible to improve the operation of poorly operating enterprises as well. In many cases the results turned out to be rather modest. Control systems proved effective only at those plants and factories which had operated well in the past, where sophistication of production had also previously been high. This instructive experience could repeat (in some places it is already being repeated) with automation as well. Even the simplest robots cannot be placed simply in any shop, at any plant. There would not be any particular return on effort.

The following example was cited. A robot-equipped line for welding structures was installed at a certain enterprise. The robot did its job well, but the workers were not particularly pleased with the results. And how can anybody claim that things were eased or facilitated for the workers, since at the head end of the line one worker manually fed to the robot workpieces weighing 25 kilograms, while at the end of the line another worker manually removed finished products weighing 50 kilograms. This does a disservice to the very idea of automation! It is essential to prepare good "soil" for it. And this means that enterprises must raise the level of production sophistication higher, utilize the most modern equipment, and train personnel.... The following statement was made by the round-table participants: if a plant has numerically-controlled machine tools, it can be considered to be an enterprise with a fairly high level of sophistication, while if it lacks such equipment (regardless of reasons!) it is yesterday's plant. This is perhaps too categorical a statement, but it is essentially correct. A robot is organically assimilated only where production has been adjusted and calibrated to millimeter and seconds.

Discussion participants talked about various ways of automating. In particular, they stated that it is essential to work on "interfacing" robots with numerically controlled machine tools, that this can help turn over to machines auxiliary operations of loading and unloading parts. Automation of existing equipment can be carried out in stages -- at first setting up individual units, and subsequently fully automated sections, shops and entire factories, which would be controlled by powerful computers. Robots must "have the ability" quickly to adapt to new operating conditions.

It was quite correctly noted, however, that in this area sometimes the proper sequence of development is not followed. Total automation should begin with engineering design. The designs of products themselves should bear in mind ease of automated assembly. There is considerable reserve potential in this area. We shall cite the following facts. When an exterior component on a certain mechanism was turned upward 30 degrees, which was not of fundamental significance for the design proper, assembly now required not a complex robot but rather a very simple one, costing one tenth as much. Design should become the first, and mandatory stage of total automation. Initial experience, if we may use that term, has been acquired by the Minsk Timepiece Factory. At this factory all parts design drawings

are first submitted to the mechanization and automation department. And many designs are reworked in order subsequently to be able to automate the manufacture of any component. But this is merely the beginning. It is essential to make every effort to develop projects involving the designing of fully robot-automated shops and plants. A computer in automated mode will design a complex machine for automated assembly by robots -- this is how experts view the factory of the 21st century. And we must bring this enticing prospect closer to the present.

This will not be easy. There are still a great many various difficulties involved in designing and building automatic manipulators, let alone the design of robot-integrated industrial processes. Up to the present time there exists no plant specializing in building such robots. Each branch of industry and individual enterprises build their own robots. It is natural that one does not expect particularly high quality. Unquestionably it is better to have something than nothing at all. Even the simplest robots -- "without eyes and without intellect" -- which are not so complicated to build right at factories, can be very beneficial initially. But this does not constitute a basic solution to the problem. Special component parts for industrial robots are not being developed and are not being manufactured. Robot designers, for example, must utilize hydraulic equipment designed for machine tools. There are extremely promising robot designs which are difficult to implement because of a lack of requisite fractional-horsepower motors. Generally speaking, today automatic robot manipulators promote the development of many other branches of industry.

Much also depends on training personnel. Much is already being done in this area, and prospects for the future are good. A new area of specialization is being introduced this year, for example, at the Minsk Radio Engineering Institute, with emphasis on application of robot technology. It is necessary to determine specifically, however, what scientific research institute should train specialists in automatic robot manipulators and in what area. Certainly a graduate program in this area of specialization could be established in this republic. There is need for specific publication of materials pertaining to this area, and regular seminars should be offered.

In general there is needed greater coordination of efforts both in research in the area of robot technology and in the area of adoption of research results and training of specialists. And there is no time to waste, for the robot is already knocking at the door.

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